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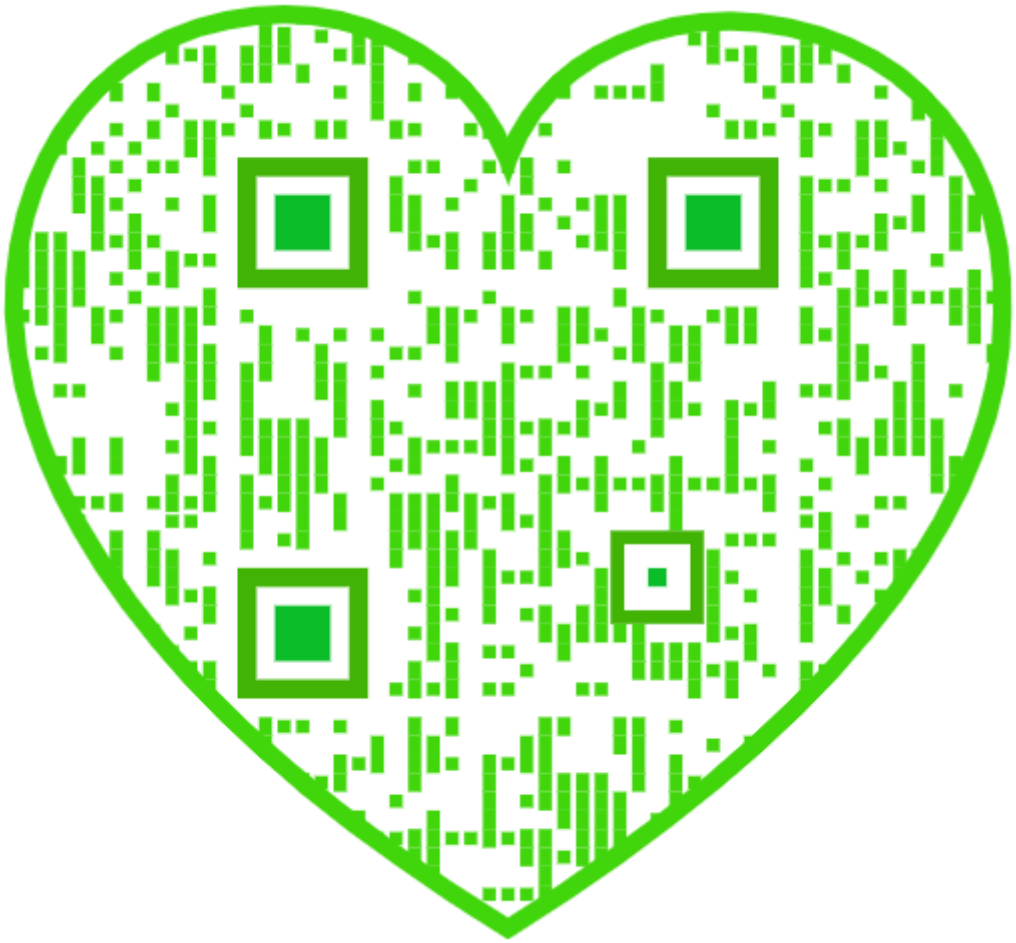

Mary L. LeClere

Presented by

Mary L. LeClere, D.O.

COLLEGE OF OSTEOPATHIC PHYSICIANS
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Lyle G. McNeile

NOTES ON PATHOLOGICAL AND OPERATIVE OBSTETRICS

BY

LYLE G. McNEILE, M. D.

PROFESSOR OF OBSTETRICS, COLLEGE OF PHYSICIANS AND SURGEONS, MEDICAL DEPARTMENT OF THE UNIVERSITY OF SOUTHERN CALIFORNIA; SUPERVISING OBSTETRICIAN, LOS ANGELES HEALTH DEPARTMENT; ATTENDING OBSTETRICIAN, LOS ANGELES COUNTY HOSPITAL

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INTRODUCTION

The obstetric art is rapidly assuming its proper position among the medical specialties. The importance of the subject is today receiving more recognition than ever before, as a result of the late war, and consequent need for child conservation. The medical student of today is far better equipped to deal with the intricacies and difficulties which arise in the delivery room than ever before in the history of medical education. While in the other branches of medicine and surgery the attendant is usually able to look up the authorities regarding the diagnosis and treatment of the condition with which he is confronted, in obstetrics he is compelled to put into practice the knowledge which he already possesses, and to apply that knowledge at once. If he is faulty in his tehcnical skill, the patient and her offspring are the innocent sufferers.

Regard for the welfare of the unborn child is growing year by year. This entails a more careful supervision of the patient, during pregnancy and labor, and the early recognition and treatment of the various obstetric accidents. The attendant must recognize that he is treating two patients, and that the rights of both are to be respected. For the mother to endure the disability due to pregnancy, and the suffering of labor, with its consequences, and then to be presented with a dead child, is a serious calamity.

The fundamental principle in obstetrics is to deliver a healthy child in a manner which traumatizes or otherwise damages both mother and child in the last possible manner. It is not sufficient to measure obstetrical success by the number of living mothers and babies, but the morbidity, which may incapacitate the patient, must always be considered.

An "obstetric conscience" is essential. In general surgery, the physician is often prompted through fear of criticism on the part of his associates, to be aseptic, and to be conservative. In private obstetrical practice, on the other hand, his environment is such that without this "obstetric conscience" he may find it easy to excuse errors in technique and in judgment, by the application of a time-worn phrase, "Due to poor surroundings."

After several years of experience in teaching obstetrics, and in consultation practice, the author has concluded that many of the errors into which medical students and young practitioners fall are due to lack of specificity in outlining diagnosis and treatment, as found in the larger text-books. He feels that in the early years of his practice, the physi-

cian can obtain better results if he has a definite plan to follow, than would be the case if he is compelled to choose, without experience, from the many varied modes of treatment to be found in even a single large text-book.

No claim for originality in these notes is made. The notes are not to be considered in any sense a substitute for a text-book. The object has been the correlation of the essentials of pathological obstetrics, presented in such a form as may perhaps be suitable for senior medical students, or for busy practitioners. Neither are the notes to be considered as a quiz-compend, for they do not contain a great deal of material which is considered quite essential by the various medical examining boards.

Extracts and quotations have been freely made, particularly from the text-books of De Lee; Cragin; Hirst; Edgar; Shears; Polak; Berkeley and Bonney; Galabin and Blacker; Bourne; and from Notes issued by Chas. S. Bacon; Herbert M. Stowe; and Chas. Edward Ziegler.

My sincere acknowledgments are made to those members of the Class of 1917, College of Physicians and Surgeons, Medical Department of the University of Southern California, through whose cooperation these notes were made possible, and to the Western Linotyping Company of Los Angeles, for their most painstaking work in the composition of the notes. To my wife, Dr. Olga McNeile, I am indebted for her encouragement and great help in the preparation and proof-reading of the notes.

LYLE G. McNEILE.

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SECTION I

Pathological Pregnancy

CHAPTER 1

Abortion

Def.—The term abortion is generally held to mean the premature expulsion of the ovum before it is viable. Some authors limit **abortion** to the expulsion of the ovum prior to the sixteenth week; **miscarriage** from the sixteenth to the twenty-eighth week, and **premature labor** between the twenty-eighth week and full term. By **threatened abortion** we mean that signs of the premature expulsion of the ovum have appeared. By **inevitable abortion,** or abortion in progress, we mean that the expulsion of the ovum has progressed to such a point that the abortion cannot be prevented by surgical or medical means. By **incomplete abortion** is meant that while a portion of the products of conception have been expelled, there is a retention of a part of the ovum within the uterus. **Missed abortion.** As a rule, upon the death of the fetus it is expelled within a short time, but may be retained within the uterus for months. **Induced abortion.** The bringing about of the expulsion of the ovum by medical or surgical means. **Spontaneous abortion.** An abortion resulting without interference by mechanical or medical means. **Therapeutic abortion.** The termination of pregnancy by artificial means, for the relief of conditions which threaten the mother's life.

Pathological Anatomy—First month, generally expelled entire with decidua vera. **Second month,** either entire, with decidua, or else the sac ruptures and the fetus and decidua are expelled separately. **Third month,** rarely entire. Usually the fetus is first expelled, followed after hours or days, by the placenta and membranes. The fetus may be alive or dead. Retention of the placenta is especially liable during the third and early fourth month owing to its close attachment to the uterus during this period. Whatever the etiology of an abortion, the pathological result is usually the effusion of blood into the decidua or between the

decidua and the uterine wall. If this is sufficient to separate a large amount of placenta or membranes, uterine contractions are excited, and a part or the whole of the ovum is expelled from the uterine cavity.

Etiology—(1) **Induced abortion.** Therapeutic or criminal. Oxytochic drugs, massage, electricity, douches, dilation of the cervix with sounds, tents, etc.; intrauterine injections, sounding, rupture of membranes, curettage.
(2) **Spontaneous Abortion: A.** Factors which stimulate uterine contractions; drugs such as ergot and quinine; massage, electricity, vaginal douches, acute (infectious) and chronic (syphillis) diseases. (Note: They are usually associated with local uterine diseases which are sequellae of the general condidtion.) Diseases of the endometrium and decidua; displacements of the uterus; distention of the uterus (polyhydramnion). Tumors.
B. Factors which chiefly tend to cause injury to, or cause separation of, the ovum;—Trauma; falls; placenta previa.
C. Death of the fetus, which then acts as an intrauterine stimulant. Due to obstruction of the circulation in the cord; disturbed placental function; placental separation; syphilis of the placenta.
D. Fetal disease: This may be due to infection, acute or chronic (syphilis) or may be due to developmental errors.
E. Paternal causes: Syphilis.

Symptoms: **Threatened** abortion usually begins with a bloody discharge from the vagina, which is accompanied or soon followed by slight recurring pains. With appropriate treatment the hemorrhage and pain may subside, and the patient be delivered at full term. **Inevitable** abortion is characterized by the same signs and symptoms as threatened abortion, but, since this is a later stage there will be found, in addition to pain and hemorrhage, dilation of the cervix and protrusion of the membranes. The passage of clots over several days is conclusive evidence that the abortion is inevitable, even though the cervix is undilated. **Incomplete** abortion is diagnosed by history of the passage of a fetus, followed by bleeding which does not respond to treatment in four or five days. The cervix is usually dilated to one or two fingers, and the placental tissue is frequently palpated in the cervical canal. **Warning:** Do not assume that the abortion is incomplete unless you see the fetus. Many women give this history and request a curettage, who are only desirous of obtaining a criminal abortion.

Prophylaxis—Many cases who are desirous of obtaining a living child, will apply early in pregnancy, and give a history of repeated abortions. In these cases excellent results may be obtained if the case is carefully examined and treated. The **hygiene of pregnancy** should be carefully explained, and especial caution given against over work or excessive exercise, travel, the use of the hot or cold bath, douches, sexual intercourse, etc. Absolute rest in bed, at time of month corresponding to menstrual periods.

Syphilis is probably the most important cause of repeated abortions. A Wasserman on both husband and wife should be insisted upon. It must be remembered that a negative Wasserman would not necessarily mean that the abortions were not due to syphilis, and it is frequently advisable to treat for syphilis regardless of the laboratory findings.

In my private work, I begin active syphilitic treatment in every case giving a history of repeated abortions, and in all cases giving a history of stillbirths, the cause of which is uncertain. The treatment is begun as soon as the patient registers, and continues throughout pregnancy. The patient must be seen frequently and the mercury discontinued temporarily if signs of beginning salivation appear. I have not been satisfied with the results following the administration of salvarsan and neo-salvarsan to pregnant patients, and depend entirely upon mercurials and sodium cacodylate hypodermically.

In the average case I have found the following routine treatment satisfactory: Mercuric iodide, gr. ⅛, is given twice a week, for one month. The patient is then given protoiodide of mercury by mouth, beginning with a dosage of ¼ grain three times a day, and gradually increasing to ½ grain three times a day. With the protoiodide she receives cacodylate of sodium, beginning with a dose of 1½ grains given hypodermically three times a week, and gradually increasing the dose to 3 grains, given at first twice, and later three times a week. The patient must be carefully watched for signs of mercurialism, and treatment temporarily stopped, if the condition supervenes. Treatment must be systematic, and energetic, but the results are extremely satisfactory.

Displacements of the uterus: The uterus should be replaced, and maintained in its normal position with a properly fitted pessary.

Treatment—Threatened Abortion:

(1) Absolute rest in bed. The patient should remain in bed for at least three or four days after symptoms disappear.

(2) Light diet.

(3 Opiates, to quiet uterine irritability. Morphine, gr. ¼ by hypodermic, should be the initial dose. This should be repeated every two or three hours for three doses, and then given as the occasion arises, for uterine contractions (pain). Codeine, heroin, trional, and

the various other drugs recommended have not given me good results.
(4) Avoid enemata, and any but very mild cathartics.
(5 Apply ice bag over lower abdomen.

Inevitable Abortion:

(1) If the cervix is dilating rapidly and everything progressing favorably, allow the uterus to empty itself without interference.
(2) If dilation is slow and the hemorrhage severe, a Dublin pack, or vaginal tampon of cotton, will control the hemorrhage. At the end of 24 hours, when the pack is removed, the ovum will usually be found lying in the cervix or upper vagina.
(3) If the cervix is dilated or easily dilatable, digital removal of the products of conception, under anaesthesia if necessary, will give best results.
(4) Curettage will give good results in non-infected cases, seen during the progress of a spontaneous abortion, if the pregnancy has not progressed beyond the second month.
(5) A gauze trailer, tightly packed into the lower uterine segment and cervix, is indicated if the cervix is not dilated sufficiently to do a digital removal, in cases beyond the second month.
(6) The ovum forceps have a definite place in the treatment of inevitable abortion. They are particularly valuable after the second month, when the uterus is to be emptied at one operation.
(7) Pituitary extract, by hypodermic, will hasten the emptying of the uterus, and will promote involution and control hemorrhage after it is emptied.

Incomplete Abortion:

(1) Criminal abortions, septic abortions and all febrile cases, should receive expectant treatment, as outlined under the treatment of sepsis, unless active interference is indicated by hemorrhage.
(2) Spontaneous abortions, non-febrile, prior to the end of the second month, should be curetted under anaesthesia.
(3) Spontaneous abortions, non-febrile, after the end of the second month, are best treated by emptying the uterus by digital removal of secundines. If this cannot be accomplished, the ovum forceps, properly used, will give good results.

CHAPTER 2

Diseases of the Amnion and Chorion

HYDATIDIFORN MOLE

Definition—This is a disease of the chorion in which there is a cystic degeneration of the chorionic villi.

Etiology—Unknown.

Frequency—1 in 2400 cases.

Pathology—The terminal villi are changed into vesicles varying in size from very minute ones to those one or two centimeters in diameter. While the stroma is somewhat degenerated, the chief change is a proliferation of the syncytium and in Langhans layer. Associated with this change are degenerative changes. One characteristic of these two layers in a hydatidiform mole which is of immense clinical importance, is their tendency to erode and penetrate. Thus they always burrow into the decidua, and in some cases may even penetrate the uterine musculature, so that the vesicles may be found projecting through the uterine wall. The fetus dies and is absorbed.

Prognosis—Good with prompt, well directed, early treatment. The dangers are sepsis, hemorrhage, perforation of the uterus, and especially, chorio-epithelioma.

Signs and Symptoms—The patient usually complains of an irritating hemorrhage, or a sero-sanguineous discharge. On close inspection this discharge frequently will be found to contain characteristic vesicles.

Upon examination it is noted that the enlargement of the uterus is greater than would be expected for the period of pregnancy. Thus at three months, the uterus is frequently enlarged to the size of a five or six months' pregnancy. The fetal heart tones are absent, fetal movements are not elicited, and the fetal parts are not palpable. The uterus feels "doughy." On vaginal examination the cervix is partially dilated, and the lower uterine segment contains clots and vesicles.

Diagnosis—Based upon the excessive size of the uterus, its boggy feel, the absence of fetal heart tones and fetal movements. The discharge of vesicles is pathognomonic. The disease occurs during early pregnancy.

Treatment—Empty the uterus. In no other condition is so much care necessary in performing this, on account of the danger of perforating the uterus. The curette

should never be used in this condition.

The patient, surgically prepared, should be anaesthetized and the cervix dilated manually or with graduated sounds. (Care in using sounds, not to perforate.) Digital removal of the uterine contents, followed by uterine tamponnade.

These patients must be watched carefully for at least one year after the removal of a mole, on account of the danger of a chorio-epithelioma.

CHORIOEPITHELIOMA

Definition—A malignant degeneration of the syncytium and of the cells of Langhans' layer, characterized by extremely rapid growth and metastatic involvement of distal regions.

Etiology—Unknown. Fifty per cent of the cases follow a hydatidiform mole, but the condition may follow an abortion or a full term pregnancy.

Pathology—The primary growth is usually at the placental site, but may be elsewhere. It is a soft, vascular, purplish mass. The growth is very rapid, and as erosion of the venous channels takes place metastases occur. The lungs and vagina are frequently the sites of the first metastases. Any of the organs or tissues of the body may become involved.

Signs and Symptoms—A typical hemorrhage, particularly after a mole or an abortion. Any hemorrhage which persists should call attention to the condition, and an examination of uterine scrapings should be insisted upon.

The symptoms are those of anemia from the hemorrhages, and cachexia and sepsis from the malignant growth in the uterus.

Treatment—Immediate pan-hysterectomy.

POLYHYDRAMNIOS

Definition—An excessive amount of liquor amnii. This is usually considered as anything over two liters.

Synonyms—Hydramnion, hydramnios, etc.

Etiology—(1) **Fetal**, from obstruction in circulation, as knot in the cord; disease of liver; multiple pregnancy; increased urinary output. (2) **Maternal**, from disturbed circulation, as in cardiac or renal disease. (3) **Amniotic**, from inflammation of the amnion.

Symptoms—In the **acute form** the uterus begins to enlarge rapidly, usually between the fourth and sixth month of pregnancy. The symptoms are all due to the mechanical effect of this rapidly enlarging uterus. Thus the abdominal walls become tense and tender, and as a result of the rapidly increasing abdominal pressure,

dyspnoea and cyanosis appear. Edema of the lower extremities and vulva now appears, as a result of mechanical interferences with the circulation. The examiner is not able to accurately map out the fetal parts, on account of the great excess of liquor amnii. Gastric disturbances, due to pressure, are common. In the **chronic form,** which is more common than the acute, the onset is more gradual and the symptoms not as well marked.

The kidneys are apt to become involved in either form, as a result of pressure and circulatory disturbances.

Diagnosis—From the signs and symptoms. Differentiate from (1) Twins, (2) Ascites, (3) Ovarian cyst, with or without pregnancy. The possibility of co-existence must be borne in mind.

Hydramnios	vs	Twins
1. Tense, distended uterus.		1. Not marked.
2. Fetal parts indistinct.		2. Fetal parts easily felt. Multiple extremities.
3. Fetal heart not heard.		3. Fetal heart tones easily heard. May be possible to elicit two heart beats, of different rates.
4. Pressure symptoms well marked.		4. Pressure symptoms not marked.

Hydramnios	vs	Ascites
1. Percussion note not changed with change of position.		1. Percussion note changes with change of position.

Treatment—Each case must be judged upon its own merits. The acute type is very rare, and it is usually necessary to terminate the pregnancy. Induction of labor by the use of the colpeurynter will give the best results, but should be preceded by the artificial rupture of the membranes, allowing the liquor amnii to drain off slowly.

In the chronic type watchful expectancy is the rule. The case must be carefully watched for evidence of cardiac or renal insufficiency.

After delivery these cases must be carefully watched for postpartum hemorrhage, which frequently follows the overstretching of the uterus, or the two rapid emptying of its contents.

Prognosis—The dangers to the mother are postpartum hemorrhage, uterine inertia and necessity for operative interference.

The dangers to the child result from prematurity, malpresentations, prolapsed cord, and operations of delivery.

CHAPTER 3

Pyelonephritis

Etiology—Inflammation of the kidney and ureter is very common during pregnancy, resulting from partial obstruction of the ureter through pressure exerted upon it by the rapidly enlarging uterus. Since the uterus is a pelvic organ up to the third month, the condition is rare during early pregnancy. The normal obliquity of the uterus being to the right, it is usual to find the right uerter, rather than the left, oftenest affected. As the pressure on the ureter becomes more pronounced, the ureter becomes dilated, and infection takes place. B. Coli Commune is the commonest infecting organism.

Clinical History—Usually after the fifth month, the patient will complain of pain, usually referred to the right iliac region. The pain radiates to the groin, but palpation usually reveals tenderness in the right lumbar region, rather than in front.

The temperature is usually elevated, and may vary from normal to 102 or 104 degrees F., in the severe types of the disease. In the acute form, the onset is sudden, with a severe chill and elevation of temperature. Urination is usually frequent, as in cystitis, but many cases prove exceptions to this rule.

Diagnosis—(1) Pain and tenderness in the region of the kidney, (2) Rise of temperature, (3) Acid urine containing pus cells, (4) Frequent urination.

Differential Diagnosis—(1) Appendicitis, (2) Typhoid fever, (3) Cystitis, (4) Salpingitis.

Treatment—(1) Absolute rest in bed.

(2) Postural treatment. Knee chest position, five minutes every two hours.

(3) Change urine to alkaline reaction. Lithium citrate, gr. 15 in one glass of water, several times a day, will give good results.

(4) Force liquids. By mouth, rectum, hypodermocleisis.

(5) Hexamethylenetetramine, gr. 7½, q. i. d.

(6) Ice bag for pain.

(7) Interruption of pregnancy is very rarely indicated. If in spite of medical and eliminative treatment, the condition of the mother is not improved, it must be considered.

CHAPTER 4

Ectopic Pregnancy

Def.—Ectopic Pregnancy is a general term signifying a pregnancy in any location outside of the normal site of attachment of the fertilized ovum, i. e., the uterine cavity. This would include a pregnancy in the interstitial portion of the tube, or a pregnancy in the horn of a bicornate uterus. **Extrauterine pregnancy** is a limited term applied to a pregnancy which is wholly outside of the uterus, i. e., tubal, or ovarian. **Tubal pregnancy** refers to a pregnancy which is limited to the Fallopian tube. There are three varieties of tubal pregnancy, which take their names from the portion of the tube in which the pregnancy exists. These are **interstitial** pregnancy, referring to pregnancy in the interstitial portion of the tube; **isthmial** pregnancy, or pregnancy in the isthmus of the tube; and **ampullar** pregnancy, referring to pregnancy in the ampulla of the tube. **Ovarian** pregnancy refers to the fertilization of the ovum before it is extruded from the graffian follicle, and its subsequent development in the ovary. This is extremely rare. **Abdominal** pregnancy is always secondary to the tubal or ovarian types. **Cornual** pregnancy refers to a pregnancy in the horn of a unicornate or a bicornate uterus.

Etiology—Since normally fertilization of the ovum takes place in the tube, it is rational to conclude that the ordinary forms of ectopic gestation results from some hindrance to the advance of the impregnated ovum along the tube towards the uterus, and the partial development of the ovum at the point of detention.

The causes might be referred to (1) **Conditions in the lumen of the tube,** as diverticulae; strictures; inflammation of mucosa; polypi. (2) **Conditions in the wall of the tube,** as thickening of the wall following previous salphingitis, with decreased peristaltic action, and arrest of the fertilized ovum within the tube. (3) **Conditions outside of the tube,** as pelvic tumors; adhesions causing angulation of the tube.

Pathology—Uterus: The uterus is slightly enlarged in ectopic pregnancy. The enlargement is proportionate to the distance between the pregnancy and the uterine wall. Thus, in the interstitial type, the uterus will be considerably enlarged, and during the first three months the question of an intrauterine pregnancy might remain in doubt. In the ampullar type, on the other hand, there is very little enlargement of the uterus.

A true decidua is present in the cavity of the uterus in a case of ectopic pregnancy. This is usually cast

off in small shreds between the eighth and twelfth week, but occasionally is extruded en masse, as a decidual cast.

Fallopian Tube: A pseudo-decidua forms in the tube, at the site of the arrested ovum. As development of the ovum takes place, the chorionic villi erode and invade the tubal wall, which, when compared with the uterine wall, is little suited to accommodate a growing embryo. The walls of the tube are thinned and weakened, and its blood vessels eroded. There is practically no hyperplasia and hypertrophy of the muscle tissue of the tube, as is seen in the normal uterus during pregnancy. Hemorrhage results from either the erosion of the small vessels of the tube by the trophoblast, or commonly by rupture of the tube as a result of the increase in size of the ovum. The hemorrhage is usually arrested by clotting of blood, made possible by the low blood pressure due to the initial hemorrhage, and the retraction of the blood vessels. The first hemorrhage is usually not fatal.

Escape of Ovum: The ovum may escape **outward,** into the abdominal cavity, by **tubal abortion** through the fimbriated extremity. This is seen especially in the ampullar type, as the fetal trophoblast, by its eroding action, opens up the decidua and sets free the ovum in the lumen of the tube, it being forced along the canal, and out of the fimbriated extremity, by the pressure of hemorrhage from the eroded vessels. The ovum may escape **upward** by rupture into the peritoneal cavity. **Downward** rupture may take place, and the ovum become arrested between the folds of the broad ligiment. **Inward** rupture of an interstitial pregnancy, into the cavity of the uterus, is a theoretical possibility. **Tubal abortion** is the most common outcome of tubal pregnancies in the ampulla. It usually occurs during the first two months, when, as a result of hemorrhage into the lumen of the tube, the impregnated ovum is forced through the fimbriated extremity into the peritoneal cavity. This tubal abortion may be **complete,** and if this is true the lumen of the tube is left empty and the hemorrhage into the peritoneal cavity ceases as in complete uterine abortion. If the ovum is only partially expelled, it is called **incomplete tubal abortion,** and subsequent hemorrhages are to be expected.

Ovum: The escape of the ovum by either tubal abortion, or rupture of the tube, usually marks its death. If extruded into the peritoneal cavity, the ovum usu-

ally gravitates into the cul-de-sac, and is either absorbed, undergoes mummification, or is changed to a lithopedian. Since some hemorrhage always accompanies the rupture, a pelvic hematocele nearly always results. On account of the close proximity to the rectum, an infection of the hematocele frequently takes place. If the fetus has advanced to or beyond the fourth month, it may remain dormant in the abdomen for months or years, but suppuration may be expected at any time, and the fetal bones slough into and be expelled through the patient's rectum, bladder or vagina. So-called abdominal pregnancy results from a gradual extension of the fetal sac from either the fimbriated extremity of the tube, or through a rupture in the wall of the tube. It is evident that the rupture is so gradual that the placental attachment is not greatly disturbed.

Clinical History—Prior to the rupture of the tube, the history is essentially that of an early pregnancy, i. e., menstruation ceases, there is some increase in the size of the uterus, breast changes are present. As a rule, morning sickness is aggravated, but there are many exceptions to this. After a variable period of a few days to a month or more, there is, in practically all cases, some irregular bleeding. The amount is less than that observed at the normal period, and the blood frequently contains clots or shreds of decidua. There are frequently cramp-like pains, especially on the affected side.

Upon examination a mass at the side of the uterus is usually demonstrable. This mass is exquisitely tender, semifluctuating, and usually pulsating.

Rupture of the tube gives a characteristic history. The woman, while engaged in her usual household duties, is **suddenly** taken with a **sharp** pain on the affected side. This pain frequently radiates down the thigh. It is severe, and the patient says that it feels as though something had "torn loose." It is followed by a feeling of faintness, and often by syncope. The patient becomes pale, the pulse becomes feeble and rapid, the respiration becomes rapid, there is air hunger, the body is covered with cold perspiration, temperature becomes subnormal.

Diagnosis—There is no condition in obstetrics in which a prompt diagnosis and immediate treatment is of such great importance to the patient, as in ectopic pregnancy.

Before rupture, the (1) **history** of an early pregnancy, with (2) **irregular bleeding,** should always lead the attendant to suspect ectopic pregnancy or miscarriage. (3) A **tender mass,** located at the side of the uterus, is significant. (4) **Cramp-like pains,** on the affected side, are usually present prior to rupture. (5) **Fever,** and a (6) **leucocytosis,** may or may not be found.

After rupture, the (1) history of an early pregnancy, with irregular bleeding, the occurrence of a (2) sudden, sharp pain, followed by (3) collapse, are characteristic. After rupture it is frequently possible to palpate a mass at the side of the uterus, but with a characteristic history, the inability to palpate such a mass would not be of sufficient importance to change the diagnosis.

Advanced abdominal pregnancy is rare, but as stated, occasionally occurs as the result of the rupture of a tubal pregnancy, without destruction of the life of the embryo. The typical history is one of a normal pregnancy, with a "threatened miscarriage" in the early months. This "threatened miscarriage" was characterized by some discharge of blood, accompanied by cramp-like pains. (Note—The threatened miscarriage was the rupture of the tube.) At or near term, in the typical case, weak uterine contractions occur. This constitutes spurious, or **false labor,** and frequently the pains subside and we have the condition known as **missed labor.** (Note—In these cases the fetus is partly absorbed; or mummification occurs; or a lithopedian results, with ultimate slough into the bowels, bladder or vagina.) The diagnosis is based upon the (1) history of a threatened miscarriage, followed by some pelvic inflammation in early pregnancy; (2) the physical signs of a fetus lying nearer than normal to the abdominal wall; (3) fetal movements very distinct; (4) fetal parts palpable, as though lying just beneath the skin; and the demonstration of a (5) small, empty uterus, separate from the sac containing the products of conception. (Note—The use of a uterine sound will clear up the diagnosis in many of these cases.)

Differential diagnosis—

Miscarriage	vs.	Ectopic Pregnancy
1. Onset gradual, pains resemble labor pains.		1. Onset sudden, pains irregular, colicky, localized on one side usually.

2. No evidence of internal hemorrhage and shock.	2. Internal hemorrhage and shock present after tubal rupture.
3. No distention of abdomen.	3. Frequently distended.
4. Uterus larger; cervix patulous; no unilateral mass.	4. Uterus smaller, cervix closed, mass alongside the uterus.
5. Mass discharged from uterus shows chorionic villi.	5. Mass shows only decidual cells; no chorionic villi.
Pyosalpinx vs.	**Ectopic pregnancy**
1. Uterus not enlarged; cervix not softened.	1. Uterus enlarged; cervix softened.
2. Condition sub-acute or chronic; history of many exacerbations.	2. Condition acute; nothing resembling this attack before.
3. If rupture occurs; pulse slower, signs of sepsis appear, no signs of hemorrhage.	3. If rupture occurs: pulse rapid, shock, signs of internal hemorrhage, no sepsis.

In addition to these, we must consider (1) Acute appendicitis; (2) Perforated gastric ulcer; (3) extrauterine tumors.

Prognosis—The rights of the child are to be disregarded, since even though the case goes to viability, the child is usually deformed, or does not survive. If the case is treated expectantly, about 75 per cent of the mothers will be lost. With a prompt diagnosis, and immediate surgical treatment, the mortality will be very low. While it is true that in a large number of cases death does not follow the first hemorrhage, yet it is equally true that on account of the primary hemorrhage, and pelvic hematocele, these patients are poor risks if operated after the second hemorrhage.

Death is due to hemorrhage or sepsis.

Treatment—Prior to tubal rupture or abortion, immediate laparotomy, with resection of the pregnant tube, is indicated. Operation should be performed as soon as diagnosis is made. Great care should be taken in vaginal or external examination of suspect cases, on account of the great danger of rupturing the tube.

At the time of tubal rupture or abortion: There are very few exceptions to the dictum, "immediate operation in all cases." If the tube has ruptured the hemorrhage may continue until the patient dies. The author operates as soon as the diagnosis is made, unless the

patient is in such extreme collapse that the operation in itself would probably prove fatal. In these desperate cases absolute rest, brought about by the administration of morphine; replacement of body fluids by hypodermocleisis and proctocleisis; extreme care to prevent, by the administration of drugs, or otherwise, the too rapid rise of blood pressure; and operation, on the patient's bed, if deemed advisable, after reaction has occurred, will give the best results.

Never give strychnia or any drug which raises blood pressure, in a case of ectopic pregnancy before operation, since the elevation of blood pressure often will cause a fresh hemorrhage, and may result in the loss of the patient.

As soon as the hemorrhage is controlled, during operation, stimulation, with intra-venous administration of physiological salt solution, is indicated.

In advanced ectopic gestation, in my opinion, immediate operation is indicated, regardless of the viability of the child. It is a known fact that a large proportion of these children are deformed, or do not survive delivery.

CHAPTER 5

Toxemia of Pregnancy

Definition—"Toxemia of pregnancy" is a term used to describe and include a variety of pathological conditions arising during pregnancy which are of unknown origin. It is generally held to include hyperemesis gravidarum, pre-eclamptic toxemia, eclampsia and certain other less well defined pathological conditions of toxic origin.

Etiology—Unknown. The following theories have been advanced:

(1) Bacterial origin. Plausible, but lacks confirmation.
(2) Toxic metabolic products from the body of the mother.
(3) Toxic metabolic products from the ovum. (Fetus or placenta.)
(4) Dislodged syncytial masses or chorionic villi.

It seems probable that as a result of the virulence of these toxic products, whose source is unknown, degenerative changes are produced in the liver. As a result, that function of the liver which has as its object the destruction of toxic products, is interfered with or destroyed. Thus these products are passed, unchanged, through the kidneys and other emunctuaries, producing degenerative changes. These toxins are probably intermediate products of protein katabolism.

Clinical Types—Mild Types, classified by the system involved:—

1. **Nervous:** Headache, vertigo, neuralgias, exaggeration of reflexes.
2. **Digestive:** Nausea, vomiting, constipation.

3. **Circulatory:** Palpitation, syncope, enlarged thyroid.
4. **Urinary:** Albuminurea, kidney of pregnancy.
5. **Skin:** Edema, pigmentation, eruptions.

Severe Types:

1. Hyperemesis gravidarum.
2. Pre-eclamptic toxemia. (Eclamptogenic toxemia gravidarum.)
3. Eclampsia. (Eclamptogenic convulsions.)
4. Acute yellow atrophy of liver (when associated with pregnancy).

HYPEREMESIS GRAVIDARUM

Def.—This is defined as one of the manifestations of the toxemia of pregnancy, occurring during the first half of pregnancy, and characterized by uncontrollable vomiting, rapid emaciation, and, in its terminal stages, by delirium and coma.

Whitridge Williams and others have taught that there were three types of pernicious vomiting, i. e., neurotic, reflex and toxemic. While it is true that the reflex and neurotic types do occur during pregnancy, they should not be classed as types of hyperemesis gravidarum.

Etiology—Toxemia of pregnancy. The basis is the increased sensitiveness of the nerve centers due to gravidal toxemia. Associated factors are an unstable nervous organization, including hysteria. The effect of the toxic substances upon the nervous system may be increased by peripheral irritation, such as malpositions of the uterus, chronic constipation, etc.

Pathology—Liver: The lesions resemble those of acute yellow atrophy. There is a fatty degeneration of the liver, with marked necrosis of the central portions of the lobules. There is little tendency to hemorrhage into the liver itself, as is usually seen in eclampsia. **Kidneys:** There is a degeneration of the epithelium of the convoluted tubules. **Urinary changes:** During the early stages of the condition the urine may be essentially normal, but usually contains a trace of albumen, a few casts, and often acetone and diacetic acid. The quantity is decreased, since the patient is usually unable to retain even liquids.

In normal urine from a healthy, pregnant woman, the distribution of determinable nitrogen is approximately:

Ammonia nitrogen..... 5%
Urea nitrogen.....83%

Williams has shown that in **hyperemesis gravidarum the percentage of ammonia nitrogen is increased,** while the urea nitrogen is decreased. This is of especial importance in determining whether abortion shall be

performed for the relief of the condition, since **an ammonia nitrogen of 10% or over** is evidence that there is a marked disturbance of protein metabolism with faulty oxidation, and that the toxemia, if allowed to continue, will endanger the life of the patient.

Symptoms—Usually the physician's attention is called to what is regarded as a case of aggravated "morning sickness." The severe symptoms usually appear in the third month, at a period when the ordinary vomiting of pregnancy is expected to cease. The onset may be very acute, but as a rule the course is prolonged, or chronic. The nausea and vomiting increase in severity, the frequency varying from emesis several times a day to the immediate rejection of either food or water as soon as ingested. This first period is often called the **wasting stage,** since there is rapid loss of weight as a result of deficient nutrition. As a result of metabolic changes, and of the toxemia, the so-called **pyrexial stage** soon follows. There is an elevation of temperature, often as high as 103 degrees, pulse of 120 or over, the tongue becomes dry and brown, and there is usually some diarrhoea. If pregnancy is not interrupted at this time, a **terminal stage,** usually called the mental stage, follows. This is characterized by delirium or coma, the vomiting frequently ceases, and death follows.

Jaundice and tenderness over the liver are frequently found in the severe types of the disease, and should call attention to a very grave toxemia, with possible acute fellow atrophy of the liver. In the severe types the vomited matter often becomes black from the admixture of blood.

Diagnosis—(1) An accurate and positive diagnosis of pregnancy. (Note—The failure to make this diagnosis of pregnancy may often result in a mistake in the diagnosis of hyperemesis gravidarum which will be difficult to explain to those who are interested in the patient.) (2) Signs and symptoms of hyperemesis gravidarum; (3) Urinary findings.

Differential diagnosis—A careful history and a complete physical examination are necessary in order to distinguish between emesis due to the pregnancy, (emesis gravidarum), and emesis during pregnancy, (emesis in gravidis), which may be due to causes having no relation to the pregnancy. (1) Gastric ulcer, (2) Reflex

vomiting, and (3) Neurotic vomiting, are the most important conditions to be differentiated.

Reflex vomiting is ruled out by elimination of such factors as displacements of the uterus, tumors of the uterus, diseases of the adnexa, chronic appendicitis, etc. Nearly every known physical condition has been blamed as a possible cause of reflex vomiting. There are rarely any urinary changes present, and the emesis soon stops after the cause is removed.

Neurotic vomiting is assumed if a careful examination fails to disclose a cause for reflex vomiting, and if the urinary findings rule out the toxic type.

Hyperemesis Gravidarum vs. "Morning" Sickness

(1) Urinary changes present.	(1) Urinary changes absent.
(2) Vomiting continuous, upon ingestion of food or water.	(2) Vomiting worse at some period of the day. Able to retain food and water at times.
(3) Rapid loss of weight.	(3) Very slight loss of weight.
(4) Usually in third or fifth month.	(4) Usually in second and third month.

Treatment—

(1) Absolute rest in bed.

(2) Absolutely no food or water by mouth for 72 to 96 hours.

(3) Free elimination. Dry, powdered calomel in 1-10 grain doses, every half hour or hour, has given me the best results. The Burroughs-Wellcome product is the best. Give no water with the drug, but place the dry calomel on the back of the tongue. Colon irrigations of sodium carbonate solution should be given daily.

(4) Supply liquids. **This is essential.** ½% sodium carbonate by the drop method is given continuously. If this is not absorbed freely, one quart of normal salt solution should be given by hypodermoclisis each day, 2% glucose solution may be substituted for the sodium carbonate in some cases.

(5) Gastric lavage during the first 24 to 48 hours of active treatment is advantageous. Sterile water or 1% sodium bicarbonate solution should be used and the lavage continued until the solution returns clear. Lavage may be repeated two or three times in 24 hours. If there is severe struggling during the process the

attendant must consider the possibility that the depression following its use might offset its advantages.

(6) Drugs: **Sedatives** are indicated in order to quiet nervous irritability. The use of morphine should be avoided, since it interferes with elimination and often causes vomiting in susceptible patients. Sodium bromide has given me excellent results. It is best given in 45 to 60 grain doses, in solution, by the drop method, at four-hour intervals. The required dose is dissolved in six ounces of water and the drop method started. When the entire amount has been given the container is filled with sodium carbonate solution and the drop method continued until the next four-hour interval **Adrenalin** in 15 drop doses, by mouth or by hypodermic, has given good results in some cases. **Corpus luteum extract** in a dose of at least 20 mg. daily has been advised by Hirst recently. It must be given hypodermically This product has given the author excellent results in a comparatively large number of cases. One ampoule should be given each day, until results are obtained. It is essential, in order to obtain results, that the drug be administered regularly, in full doses. An occasional dose will not produce any effect. **Serum**—The blood of the donor, who must be a normal, Wasserman negative, pregnant woman, has been separated and the serum injected into the patient. A pathological examination to determine the blood groupings and to guard against anaphylaxis is essential. Ten to 20 cc. has been the usual dose, which has been given either hypodermically or intravenously. The results have been good in many cases.

(7) Diet: The fast should continue at least 24 hours after vomiting ceases. Equal parts of milk and lime water in 1 dram doses every half hour or hour are then given for 24 hours, after which the dose must be increased and the interval slightly lengthened. Use great care in restricting the amount of food in order to avoid a relapse.

(8) Abortion: Progressive emaciation, constant rapidity of pulse (Pinard says to 120), high ammonia co-efficient, with no improvement under the treatment outlined, should lead the attendant to seriously consider abortion. Many cases are lost as a result of temporizing. Abortion should never be performed, however, without first trying active treatment.

ECLAMPTOGENIC TOXEMIA GRAVIDARUM

Def.—A specific disease of pregnancy, probably due to ovular toxins which produce distinct anatomical lesions an disturbances of function and cause a definite syndrome of symptoms, the most prominent of which are convulsions, or eclampsia.

Types—The disease is called **pre-eclamptic toxemia** in its early stages and before the convulsions appear. If convulsions are present the disease is called **eclampsia.** The student is cautioned against considering the pre-eclamptic toxemia and eclampsia as two separate diseases. Convulsions are to be expected in any severe toxemia, but the presence of convulsions does not indicate the severity of the toxemia, since the patient with an irritable nervous system would be likely to have convulsions with a low grade toxemia, while one with a more stable nervous system might pass directly into coma and die without having had any convulsions.

Etiology—Discussed under "Toxemia of Pregnancy."

Pathology—Liver: Necrosis, beginning at the center of the lobule and rapidly extending towards the periphery, leaving only a mass of granular detritus surrounding the central vein. Into this necrotic area hemorrhages occur. The term "hemorrhagic hepatitis" has been used to describe these changes in eclamptogenic toxemia gravidarum. Hemorrhages frequently occur beneath the capsule of the liver, and on section the organ presents a yellowish appearance such as is seen in fatty degeneration. **Kidney:** These organs are increased in size and weight, and on section the markings are indistinct. Cloudy swelling, fatty degeneration, necrotic areas with hemorrhages, are usually noted. **Heart:** Fatty degeneration of the myocardium. **Brain:** Edema and hemorrhagic areas. **Skin:** Edema, subcutaneous hemorrhages, and jaundice.

Symptoms—There is no condition in obstetrics in which the prompt recognition of signs and symptoms is of more importance than in eclamptogenic toxemia gravidarum.

(1) **Edema**—While it is true that **occasionally** during the latter months of pregnancy there is some edema of the lower extremities, due to interference with the blood stream, yet the presence of even slight edema should cause the attendant to be on his guard, and to

always have in mind the beginning of a toxemia of pregnancy.

(2) **Headache**—A persistent headache is usually present.

(3) **Other Nervous Symptoms**—Insomnia, irritability, specks before the eyes, vertigo, twitching, neuralgia. **Pain in the epigrastrium** has been observed in 90% of my cases, preceding a convulsion by 24 hours or less.

(4) **Hemorrhagic Retinitis**—Not frequently observed before the convulsion.

(5) **Blindness**—The patient may complain that she is unable to see objects clearly. Absolute blindness often precedes a convulsion and nearly always follows one.

(6) **Urinary Changes—Albumen** appears in varying amounts. It is always to be remembered that a well marked albuminurea may appear in a very short time, and that frequent examination of the urine is necessary in order to make an early diagnosis. The amount of albumen is not necessarily an index of the degree of the toxemia, for convulsions may take place in the presence of a trace of albumen. After the first convulsion the urine usually contains a large amount of albumen.

Quantity: The quantity is usually decreased, so that frequent 24-hour specimens are necessary, in order to compare the amounts excreted.

Casts: A careful microscopical examination will usually reveal a few casts early in the disease. These will increase with the progress of the condition.

Urea: Since the amount of urea excreted varies with diet, the estimation of urea will not help the observer unless the patient is under close observation and the exact quantity of food ingested, with percentage of fats, carbohydrates and proteins, is known.

Blood: Usually found only in the severe types of the disease, or in the terminal stages of the milder types.

(7) **Blood Pressure**—A rising blood pressure is the most significant sign of a toxemia of pregnancy. The blood pressure in a normal pregnant woman will vary between 110 mm. and 125 mm. In eclamptogenic toxemia gravidarum the blood pressure rises until in a convulsion it may vary between 150 mm. and 250 mm. A blood pressure of 140 should always be regarded with apprehension and prompt treatment instituted. Clinically, we know that convulsions do not, except in exceptional cases, take place if the blood pressure is

below 150 mm., but after this point is reached convulsions may take place at any time.

(8) **If the toxemia leads to a convulsion,** the following symptoms ensue: **Convulsion or eclamptic seizure**—A convulsion may take place before labor, **ante-partum eclampsia;** during labor, **intra-partum eclampsia;** or after delivery, **post-partum eclampsia.** Either with or without the signs and symptoms of pre-eclamptic toxemia, the convulsion may **suddenly appear.** The eyes become fixed and staring. The eyes and lips twitch and a clonic spasm of the muscles of the upper extremities and finally of the entire body is seen. Between the clonic muscle spasms there is a tonic spasm of the different muscles of the body, in which the arms are flexed, the thumbs flexed into the palms, and the fingers bent over them. The face becomes cyanotic, the jaws are opened and closed and the tongue is usually protruded and bitten. Respiration is arrested by the contraction of the muscles of the thorax and diaphragm. There is a rigidity of the entire body, with loss of sensation and consciousness.

After a period of alternating clonic and tonic spasms lasting from one to five minutes, the patient passes into coma, with stertorous respiration and dilatation of the pupils.

The patient may recover consciousness in a short time or may remain in coma until death. There is no limit to the number of convulsions which a patient may have, nor is there any regularity about their onset. One convulsion may immediately succeed another until death ensues.

The temperature is usually high, 102 to 104, during the convulsion, and the pulse rises to 130 to 140.

Diagnosis—The diagnosis of eclamptogenic toxemia gravidarum is made upon the signs and symptoms given. The most important prodromata of the convulsion are the severe headache, edema, visual disturbances, pain in the epigastrium, and elevation of blood pressure to or above 150 mm.

Differential Diagnosis—The diagnosis of an eclamptic convulsion is occasionally difficult. The diagnosis of pregnancy is a pre-requisite. Three conditions often simulate the condition, i. e., (1) Epilepsy, (2) Hysteria, (3 Uremia. We must also consider apoplexy.

Eclampsia	vs.	Hysteria
1. Patient not subject to convulsions.		1. History of repeated convulsions.
2. Urine shows a large amount of albumen and casts.		2. Urine usually free from albumen.
3. Edema common.		3. No edema.
4. Prodomal symptoms of a toxemia.		4. No prodromal symptoms except aura.
5. High temperature.		5. No temperature.
6. Blood pressure above 150.		6. Blood pressure normal.

Eclampsia	vs.	Epilepsy
1. Patient unconscious.		1. Patient not unconscious.
2. Coma present.		2. No coma.
3. Urine: Albumen and casts.		3. Urine normal.
4. Blood pressure above 150.		4. Blood pressure normal.
5. Muscular contractions more marked.		5. Muscular contractions less marked.

Uremia—The differentiation between uremic coma and eclampsia is impossible unless an accurate clinical history is obtained. Such a history would show, in uremia, that a preceding nephritis had existed, either before pregnancy or during early pregnancy.

Prognosis—This depends to a great extent upon the period at which the condition is recognized, and upon the treatment. The mortality to the mother, in toxemia without convulsions, is not negligible, on account of the low desistance of the patient to infection, and as a result of the operative measures which are often necessary in order to effect delivery. Over ten per cent of the viable babies are lost as a result of the effect of the toxins upon the fetus, in toxemia without convulsions. In eclampsia the prognosis will depend upon the period during which the convulsions appear. The maternal mortality in **ante-partum** eclampsia is about 33 1-3%, in **intra-partum** eclampsia about 25%, and in **post-partum eclampsia** 10%. The fetal mortality is over 50%, due to the operative delivery, and to the effect of the toxemia upon the child.

Prophylactic Treatment, Toxemia Without Convulsions—In eclamptogenic toxemia gravidarum prophylaxis is

far more important than active treatment of the well developed condition. A rigid observance of the principles outlined under "Hygiene of Pregnancy" is essential. Every pregnancy should be regarded as a possible case of toxemia. Toxemia is a common condition. Routine examination of the urine should be done in every case **at least** every two weeks throughout pregnancy. The routine examination of blood pressure should be done **at least** every three weeks during early pregnancy, and every two weeks during the latter months. A blood pressure of 140 should always be considered an indication for active treatment, and a rising blood pressure during the latter months of pregnancy should lead the attendant to be especially watchful.

The patient should be carefully instructed to report the danger signals to her physician at once. Especial emphasis should be placed upon such symptoms as edema, headaches, visual disturbances, pain in the "pit of the stomach," decrease in the amount of urine, etc.

The **patient should be seen** at least every two weeks during the latter months of pregnancy. It is not sufficient to hear from the patient through a third party. The laity are rapidly becoming educated as to the role of the physician in preventing eclampsia, and the development of convulsions is sure to be followed by severe criticism.

Active Treatment, Toxemia Without Convulsions—There are three principles: **First,** Active elimination by all emunctuaries. **Second,** The reduction of products of metabolism requiring elimination. **Third,** The emptying of the uterus if the patient's condition does not improve under active treatment.

Elimination: Since it is claimed that 90% of all of the toxins are eliminated through the gastro-intestinal tract, **active catharsis** is indicated. Calomel, in a 3 to 5 grain initial dose, followed by salines, preferably a saturated solution of magnesium sulphate, in 3 dram doses, repeated three or four times a day, and continued over a period of days or even weeks, unless the pregnancy is sooner terminated, will give excellent results. **Liquids,** given by the **drop method,** also stimulate elimination, and at the same time will replenish the loss due to active catharsis. Sodium carbonate ½% or tap water, give the best results. Since it is

often impossible to continue the drop method in the presence of free catharsis, **hypodermocleisis**, using normal salt, may be substituted for the drop method. One liter is given under the skin of the lower abdomen each day. In the severe toxemias, Fischer's solution, intravenously, in 100 to 300 cc. doses occasionally gives good results.

Reduction of Products of Metabolism—1. Absolute rest in bed. 2. Absolute milk diet, changing to a nephritic diet as the patient improves.

Emptying the Uterus—The author has made it a rule to continue active treatment over a period of several days, usually seven days, **except** that, in cases developing convulsions, or in those in which, in spite of treatment, the toxemia has not cleared up to a marked extent, it is best to empty the uterus. All urine should be saved and measured, and if there is a progressive increase in the amount of albumen excreted the uterus should be emptied. The presence of casts in the urine should be considered an indication of renal destruction, and if the condition continues the uterus must be emptied to avoid irreparable damage to the kidneys. The rights of the child in the toxemia of pregnancy are not an important factor, since over 50% are still born, and a high percentage do not survive the first few months after delivery. The author **always** regards a blood pressure of 150 mm. or over, which does not become lower under active treatment, as a positive indication for emptying the uterus.

The use of the colpeurynter as a means of inducing labor in this type of case will give excellent results. In a small percentage of selected cases, with profound toxemia, rigid cervix, and where a living child is particularly desired, caesarian section will give good results.

The author regards the eclamptic convulsion as only one of many dangerous signs of a toxemia of pregnancy. He does not regard as logical any line of treatment which neglects the emptying of the uterus until convulsions occur. Irreparable destruction of the kidneys and liver may, and often does occur, before the onset of the convulsions, and if in spite of active treatment signs of this destructive process continue, he feels that the uterus should be emptied. The attendant must not have as his sole object in the treatment

a patient who "lives" after the termination of the pregnancy, but rather a patient who lives and is "well."

Additional Methods of Treatment: Nephritin, a product of renal tissue, has given excellent results in a large number of cases. It is given in conjunction with other methods of treatment, in a dose of one tablet every hour for twenty-four hours, followed by three tablets every three hours throughout the course of the disease.

Sweating by means of hot packs or pilocarpine is advocated. This is **never** advisable, since it is estimated that less than 1% of the toxins are eliminated through the sweat glands, that the depression is profound, and often causes death, and the toxins are concentrated, while the elimination is minimal.

Venesection has its greatest field of usefulness in eclampsia. In a profound toxemia, with high blood pressure, 16 to 24 ounces of blood may be withdrawn from the median basilic vein, but this is rarely necessary or advisable.

Prophylactic Treatment: Eclampsia—The prophylactic treatment of the toxemia of pregnancy with the prompt emptying of the uterus if the toxemia does not improve under active treatment.

Active Treatment: Eclampsia—The principles in the treatment are: **First**, The protection of the patient against injury. **Second**, The emptying of the uterus. **Third**, Elimination. **Fourth**, Reduction of blood pressure.

Protection of the Patient Against Injury—The patient must be undressed, placed in a bed, under constant observation. During the convulsion, to prevent biting the tongue, a wooden mouth gag, wrapped in gauze, is placed between the teeth. Restraint of the movements is not necessary or advisable; all that may be done is to keep the woman from injuring herself. **Anaesthesia is not** given as a means of controlling the convulsions. It is to be used for operations of delivery only.

Emptying the Uterus—While there are a few recognized obstetricians who still advocate the treatment of eclampsia by the expectant method, experience proves conclusively that the rapid emptying of the uterus under deep narcosis, after the first convulsion, gives the best results. In the country, where hospital facilities and assistants are not available, the use of the colpeurynter may constitute the best means of

accomplishing delivery, but much better results will follow the immediate delivery of the case.

If the **cervix is dilated or dilatable,** manual dilatation, followed by version or forceps, according to conditions present, will give the best results.

If the **cervix is undilated, uneffaced, rigid,** vaginal or abdominal caesarian section should be performed. The vaginal route is chosen if the operator is a proficient, skillful vaginal operator, since this operation is very difficult. The vaginal route is never chosen unless the pelvic measurements are normal. (Note: This operation only overcomes resistance due to the soft parts, not resistance due to the bony pelvis.)

The **anaesthetic** should be ether, or nitrous-oxide oxygen. Chloroform is absolutely contraindicated, since it has been proven that degenerative changes in the liver, which are almost identical with those found in the toxemia of pregnancy, frequently follow the use of even a small amount of this drug.

Elimination—Purgatives should not be administered before the uterus is emptied (unless there is to be considerable delay), on account of the danger of infecting the field during delivery. **Croton oil,** in a dose of three or four drops, either in olive oil or encased in butter, is dropped on the back of the tongue before the patient is removed from the delivery room. It is usually advisable to precede the administration of drugs by mouth with a thorough gastric lavage, to prevent possible vomiting. **Calomel,** in a single five grain dose, will accomplish good results in cases where the croton oil is not available. **Magnesium sulphate,** in a dose of three drams of the saturated solution every three hours, should follow the first purgative. The salts should be continued throughout convalescence. **Drop Method:** The best method of supplying fluids and producing diaphoresis and diuresis, is by the routine use of the drop method. ½% sodium carbonate, or tap water, gives best results. **Hypoder mocleisis:** In cases where defecation prevents the continuous use of the drop method, 1 quart of normal salt, under the skin of the abdomen, is indicated. (Note: Never under the breasts, in any obstetrical condition, on account of injury to the breast tissue, and sloughing.)

Reduction of Blood Pressure—Veratrum Viridi is the best agent known for reduction of blood pressure and

the control of the convulsions in eclampsia. **Norwoods Tr. Veratrum Viridi** should be used. Veratrum Viridi should be given as soon as possible after the first convulsion. Fifteen to twenty minims, hypodermically, deep in the muscles of the thigh, are given every hour as long as the pulse remains above 60 per minute. (Note: Convulsions are not likely to take place if the pulse rate is 60 or below.) If a medical attendant is constantly present the dose may be gauged by the blood pressure, fifteen minims being given every hour as long as the blood pressure is above 130 mm. The drug should be used for at least 72 hours, according to the above rules. **Venesection** may occasionally be used to advantage where the blood pressure is very high, face flushed or cyanotic, and mental symptoms, such as headache and coma, pronounced. It is rarely used by the author.

Additional Methods—Stroganoff has advocated the expectant treatment, and controls the convulsions with morphine and chloral. His scheme of administration is: First hour, morphine, gr. ¼; second hour, chloral, gr. 30; third hour, morphine, gr. ¼; seventh hour, chloral, gr. 30; thirteenth hour, chloral, gr. 25; twenty-first hour, chloral, gr. 25. While his reported results are good, the method is illogical and never to be recommended. Chloral is not to be recommended since it occasionally produces degenerative changes in the liver. **Nephritin** has given me excellent results and should be given in the dosage outlined under eclamptogenic toxemia gravidarum.

CHAPTER 6

Hemorrhage

Hemorrhage during pregnancy or labor is **always** pathological.

It is true that a small percentage of women menstruate for one or two months after conception takes place, but it is manifestly impossible for menstruation to take place after the amniotic sac fills the uterine cavity, at about the third month of utero-gestation.

CLASSIFICATION BY PERIODS, AND SOURCES OF HEMORRHAGE

Antepartum—(1) Abnormally situated placenta—placenta previa. (2) Normally situated placenta—abruptio placentae (syn. accidental hemorrhage, premature separation of placenta). (3) Abnormally situated placenta and fetus—ectopic gestation.

Intrapartum—(1) Abnormally situated placenta—placenta previa. (2) Normally situated placenta—abruptio placentae. (3) Lacerations—ruptured uterus, cervix, vagina, perineum, vulva.

Postpartum—(1) So called postpartum hemorrhages (2) Puerperal hemorrhages.

PLACENTA PREVIA

Definition—By placenta previa is meant the development of the placenta either partly or wholly within the dilating portion of the uterus.

Varieties—(1) Central, or complete placenta previa. In this type the placenta completely covers the internal os. (2) **Partial placenta previa.** The placenta does not completely cover the internal os. It is usually understood by this term that there is an over-lapping of the internal os by the placenta, but that this placental tissue does not cover the entire internal os. A sub-variety of this type is the **lateral or marginal placenta previa,** in which the placenta, while implanted wholly or partly in the lower uterine segment, does not extend beyond the border of the internal os.

Frequency—Many cases of lateral placenta previa are unrecognized. This is not a rare condition, and probably occurs about once in 300 to 1000 cases. About 20% of all cases of placenta previa are of the central variety.

Etiology—Unknown. It is more common in multiparae. It is apparently favored by sub-involution of the uterus, with hypertrophy of the endometrium.

It is not probable that the formerly accepted view, in which it was claimed that the ovum either primarily lodged in the lower portion of the uterine cavity and developed there, or else that it had become loosened from its primary attachment above and formed a scondary attachment in the lower uterine segment, is correct.

It is now believe that the placenta, instead of developing wholly from the chorion and decidua serotina, develops in part from a portion of the chorion in apposition to the decidua reflexa; this "reflexa placenta" as pregnancy advances extends toward or over the internal os.

Symptoms—The chief symptom of placenta previa is hemorrhage. This usually appears in the last three months of the pregnancy, but cases have been reported in which a fatal hemorrhage due to placenta previa has taken

place in the fifth month. The blood is bright red, since it is arterial blood. There is no apparent cause for the hemorrhage—the patient says that it came on suddenly, without cause and without warning. The first hemorrhage is usually comparatively small in amount, but occasionally is sufficiently large to cause a fatal outcome. The first hemorrhage usually ceases spontaneously, only to reappear after a variable period—(few minutes to many days). The character and amount of the first hemorrhage is no criterion of the variety of the placenta previa.

There is no pain associated with the hemorrhage in this condition. The clinical course usually consists of a hemorrhage, relatively small in amount, which subsides without causing great alarm to the patient, only to reappear later in the pregnancy. On the other hand, many cases are characterized by a continuous dribble in the latter months of pregnancy, which leaves the patient in poor condition to withstand the grave hemorrhage which may occur unexpectedly.

Cause of the Hemorrhage—In the latter months of a normal pregnancy there is a gradual thinning out and retraction of the cervix and lower uterine segment. This condition is brought about by the intermittent uterine contractions. (Braxton Hicks.)

Since normally the placenta is situated in the upper uterine segment, this thinning out process does not affect that organ until after delivery of the fetus, when the upper uterine wall retracts away from the placental site and by this contraction causes separation of the placenta and at the same time closes the bleeding uterine sinuses.

In placentia previa, on the other hand, the placenta is attached to the lower uterine segment, which must retract away from it as pregnancy and labor advance. The lower uterine segment does not possess the power of muscular contraction (it is the dilating zone). As thinning out takes place there is a partial separation of the placenta, the uterine sinuses cannot close, and hemorrhage results.

During labor the hemorrhage is usually more profuse between the uterine contractions, since during the contraction the presenting part is forced down upon the placenta and by pressure stops the bleeding.

After delivery further separation of the placenta is interfered with, again as a result of the inability of

the lower uterine segment to contract. Hence the hemorrhage is apt to persist until the placenta is removed manually, and often until the uterus is packed with gauze.

Diagnosis—(1) A sudden, causeless, painless hemorrhage, in the last three months of pregnancy, is pathognomonic of placenta previa. This history is of great importance, (2) Physical signs: (a) The examining finger palpates a boggy moss (placenta) over the internal os. The amount of placental tissue will necessarily vary with the variety of the condition present. (b) The presenting part is high, and its landmarks are obscured by the placental tissue which lies between it and the examining finger. (Hence the importance of an accurate external examination for the diagnosis of position and presentation). (c) The examination usually excites bleeding. There is always blood upon the examining fingers. (d) On account of the vascularity of the lower uterine segment, due to the condition, the cervix is soft, and easily dilatable. **Differential Diagnosis:** (a) Abruptio placentae, (b) Rupture of uterus, (c) Carcinoma, (d) Hydatidiform mole, (e) Fibroid in lower uterine segment, (f) Threatened premature labor.

Placenta previa	vs.	Abruptio placentae
1. Painless.		1. Pain, usually at placental site.
2. First hemorrhage external, usually mild.		2. First hemorrhage concealed or external, usually severe.
3. Uterus does not increase in size.		3. Uterus usually increases in size due to internal hemorrhage.
4. Placenta over internal os.		4. No placenta over internal os.
5. No demonstrable cause,		5. May find a cause—injury, toxemia.
6. Uterus normal consistency, not tender.		6. Uterus hard, boggy, tender.

Placenta previa	vs.	Rupture of uterus
1. Occurs in pregnancy or early in labor.		1. Occurs late in protracted and difficult labor.
2. Membranes not ruptured.		2. Membranes ruptured.

3. History of causeless, painless hemorrhage.	3. History of long labor, sudden hemorrhage, pain, collapse.
4. Uterus normal consistency.	4. Uterus small, at one side, with fetus easily palpable in abdomen.
5. Placenta over internal os.	5. No placenta or presenting part palpable over internal os.
Placenta previa vs.	**Carcinoma**
1. Placenta over internal os.	1. No placenta over internal os. Cervix nodular, hard, cauliflower growth.
2. No history of offensive discharge.	2. History of offensive discharge.
Placenta previa vs.	**Hydatidiform mole**
1. Usually occurs in last three months.	1. Usually occurs first three months.
2. Uterus normal shape and consistency.	2. Uterus too large for period of pregnancy; doughy consistency.
3. Fetal parts and fetal heart normal.	3. Fetal parts and fetal heart absent.
4. Bright red blood.	4. Intermittent serosanguinous discharge containing vesicles.
Placenta previa vs.	**Fibroid in lower uterine segment**
History, character of hemorrhage, palpation of placental tissue.	History, character of hemorrhage, physical signs.

Prognosis—Very grave for both mother and child. The prognosis is more serious in the complete variety than in the partial. About 60% of the children are lost, and at least 10% of the mothers. Much depends upon the prompt recognition of the condition, and judicious, prompt treatment.

Treatment—There is no expectant treatment for placenta previa. Pregnancy should be terminated as soon as the diagnosis is made. Only under exceptionable circumstances is it ever allowable to deviate from this rule. For instance, given a case of placenta previa near the period of viability, where a living child is particularly desired, if the hemorrhage is very slight,

and the patient will remain in bed, in a well equipped hospital having a competent physician in constant attendance, it may occasionally be permissable to temporize a few weeks. This is not sane treatment even under the most favorable conditions.

It should be remembered that the dictum, "Empty the uterus at once," in placenta previa applies both in pregnancy and in labor. **Since infection is a common sequel to operative delivery in placenta previa (on account of low resistance dut to loss of blood), rigid asepsis is absolutely essential.**

1. If the patient is bleeding when seen, a **vaginal tampon** or **Dublin pack** is very valuable in enabling the attendant to get the patient to a hospital or at least to prepare for operative procedures in the home. It is not possible to pack gauze as tightly as cotton, and consequently a gauze pack will not control the hemorrhage. The patient is surgically prepared, and placed upon a table in the dorsal lithotomy position. No anaesthetic is required. Small cotton pledgets, about the size of the distal phalanx of the little finger, are soaked in a ½% solution of Liquor Cresolis Comp. Two fingers of one hand are passed into the upper vagina and the pledgets, squeezed dry, are passed into the vagina with the other hand. The fornices are first packed, then the upper vagina, and finally the outlet. The **packing should be very tight.** At least one quart jar of cotton pledgets should be used. The operation is painful, but may be a life saver, and hence should be thoroughly and carefully done. If the tampon is properly applied there is no immediate danger from hemorrhage in even the central type of placenta previa. The tampon, by its size, irritates the cervix and stimulates the powers of labor. It stops the hemorrhage, and the clotting of blood in the cervix produces a foreign body which assists in dilatation. The liability of infection is small if the proper precautions are taken. The pack is removed as soon as the attendant is ready for operative delivery, if the vaginal route is decided upon. If a Caesarian section is to be done, the vaginal pack is only removed after the section is completed.

The pack is also valuable in enabling the attendant to bring up his patient's resistance before operation. For instance, the first hemorrhage may have left the patient in such shock that she would not survive an operative delivery. After the pack is inserted, there is no fur-

ther hemorrhage, the patient may be stimulated, hypodermoclysis or proctoclysis instituted, and in 8 to 12 hours the operation performed with relative safety.

2. In **partial placenta previa** (including lateral and marginal types) there are two methods of treatment which give good results.

The colpeurynter has in recent years become generally recognized as our most efficient method of controlling hemorrhage and procuring dilatation in this condition. The large sized bag is used, thus giving us complete dilatation when it is expelled. The use of the bag may be either extra-ovular (outside the membranes, which are kept intact), or intra-ovular, in which the membranes are ruptured and the bag placed within the cavity and above the placenta. I prefer the intra-ovular method, since I feel that in the extra-ovular method (1) there is great danger of a concealed hemorrhage, due to the accumulation of blood between the placenta and the bag, and (2) the hemorrhage is not controlled by direct pressure, as it is in the intra-ovular method. The patient is properly prepared and is placed upon a table. An anaesthetic should not be used for the introduction of the bag, if it is possible to avoid it, since the pain is very slight, and the use of an anaesthetic at this period may so lower the patient's resistance as to seriously endanger her life. The membranes are ruptured, and the bag introduced into the uterine cavity, above the placenta. The bag is now rapidly filled with sterile tape attached. Patient is put to bed, the tape passed over the foot of the bed and a two-pound weight attached. The object of the weight is to stimulate uterine contraction, and to control bleeding by increasing the pressure exerted by the bag upon the placenta. As the bag is expelled the delivery is completed by performing an internal podalic version, under anaesthesia.

Braxton-Hicks' Version has for many years been considered the classical treatment for placenta previa. This method does not give the good results for mother and child that may be obtained by the use of a colpeurynter, but it has one great advantage under certain conditions, i. e., no instruments are required, and hence an emergency may be met by this method, in the absence of the bags and facilities for using them.

The patient lies in the dorsal lithotomy position, upon the table, under anaesthesia. If the cervix will not

admit two fingers, it must be dilated manually to this point. Two fingers are passed up to that portion of the fetus presenting at the inlet (assumed to be the head), and push it upward and outward, while the external hand forces the breech toward the inlet. As soon as it is possible to reach the breech through the cervix, the fingers seize a knee or a foot and draw it down into the pelvis, and through the cervix. We are satisfied to get either foot.

When the foot is out at the vulva, the version is completed and the subsequent extraction must be delayed until the cervix is dilated. If hemorrhage continues, traction of one or two pounds is made on the foot. This prevents bleeding, because of the pressure of the thigh against the placenta. Do not extract the child; do not put traction on the leg unless bleeding occurs. The object of this method is to use the child's body as a cervical tampon to stop hemorrhage, and to stimulate pains until the cervix is ready for safe delivery. The cervix in placenta previa is very vascular and is apt to tear. When the conditions are present for breech extraction, the child is delivered in the usual way.

After delivery of the child the placenta is removed manually at once, and the uterus firmly packed with gauze. This is necessary, since on account of the location of the placenta, normal separation does not take place, and we must save every drop of the mother's blood if we are to obtain a good result. The patient is now placed in a warm bed, the drop method started, hot water bags applied, and stimulation given as indicated.

3. **In central placenta previa**, three mehtods of treatment are available:—

Colpeurynter gives good results, and is recommended as the method of choice in the routine treatment of this condition. Plunge bag through placenta, into uterine cavity.

Braxton-Hicks' version will result in the death of over 50% of the children, but gives fair results in the mothers. Pass fingers through placenta in doing version.

Caesarian section, in properly selected cases, is probably the method of choice in central placenta previa. If the case is seen immediately after the first hemorrhage, is in good condition, pulse good, not over 110, child in good contion, hospital facilities available,

Caesarian section will give good results. It is **not** to be done in infected cases; in exsanguinated cases; where the child is dead or dying; or where good hospital facilities are not available.

4. **Is version always indicated?** (In delivery by vaginal route.) **No.** In certain cases of the marginal or lateral type, with little hemorrhage, rupture of the membranes, allowing the head to come down upon the placenta, will meet the indications, and the case may then be left to nature.

ABRUPTIO PLACENTAE (Premature Separation of Placenta)

Synonyms—Accidental hemorrhage, ablatio placentae.

Definition—The separation of the normally situated placenta before the delivery of the fetus. The resulting hemorrhage is called accidental, in contradistinction to the unavoidable hemorrhage which occurs when the placenta is implanted in the lower uterine segment (placenta previa).

Varieties—Premature separation of the placenta may be **complete,** if the entire organ is separated, or **incomplete,** if only a portion is separated.

The hemorrhage resulting from this separation may be **external,** in which the blood separates the membranes from the uterine wall, and escapes through the vagina, or **concealed,** if no vaginal bleeding occurs.

Etiology—(1) Trauma. A severe blow upon the abdomen, or a violent muscular effort, may cause a premature separation to take place. (2) Toxemia of pregnancy. This is an important cause. (3) Short cord. (4) Multiparity. (5) Constitutional diseases, such as syphilis, smallpox or scarlet fever.

Pathology—In a majority of cases the margin of the placenta becomes separated. Blood collects between the placenta and the uterine wall, and as the blood increases in amount the placenta is further separated and the hemorrhage increased. The blood now works its way downward, between the membranes and the uterine wall, stripping up the membranes until it finally reaches the os, and becomes an external hemorrhage.

The condition may remain as a concealed hemorrhage under certain conditions. (a) Not sufficient blood escapes to completely strip off the placenta. (b) The margins of the placenta may be very adherent, and restrict the extension of the process. (c) The blood may rupture through the membranes into the amniotic cavity. (d) The presenting part may be so tightly

wedged into the pelvic brim that blood does not escape. If the condition occurs in the early months of pregnancy, an abortion takes place.

In the latter months of pregnancy, signs and symptoms are largely dependent upon the amount of the hemorrhage.

Symptoms—Mild cases are fortunatly more common than the severe types. In the early months of pregnancy external hemorrhage, with or without pain, is the only symptom, and cannot be differentiated from abortion or premature labor due to other causes. The hemorrhage may cease spontaneously, and the patient go on to term, or an abortion may result.

With the exception of the mild type just mentioned, the characteristic case gives the following symptomatology: A history of trauma may be given, but we now believe that toxemia of pregnancy plays even a more important part, and the history and other evidences of toxemia are usually present. The patient first complains of pain in the abdomen. (Note that the first symptoms of the separation may appear hours or even days after the trauma.) The pain is severe, tearing in character, and is often referred to the site of the placenta. The pain is costant, not intermittent. The patient feels faint, and shows signs of hemorrhage. Her pulse becomes poor, and she is evidently in shock. Examination shows the uterus very much distended, uterine walls tense and perhaps bulging on one side, over the placental site. The fetal parts cannot be mapped out, and the fetal heart is not heard. If the patient was in labor when the condition appeared, the labor pains cease. There is usually some external hemorrhage, but this is not excessive, as a rule. The patient is in shock, pulse high, and weak.

Diagnosis—The history of severe onset, with pain, followed by shock, and collapse, call attention to abruptio placentae, which must be differentiated from (1) placenta previa, p. v. (2) rupture of the uterus.

Rupture of the Uterus vs. Abruptio Placentae

1. During labor, after protracted or difficult labor.	1. During pregnancy or early labor.
2. Uterus small, at one side, with neighboring tumor, the fetus.	2. Uterus enlarged, tense, symmetric.

3. Membranes usually ruptured.	3. Membranes usually intact.
4. No presenting part; uterus contracted and empty.	4. Presenting part palpable through os.
5. Fetal parts easily palpable abdominally.	5. Fetal parts not palpable.

Prognosis—Very grave for both mother and child. About 50% of the mothers die, as a result of hemorrhage, shock, the dangers of an operative delivery, and the toxemia which usually causes the condition. About 95% of the babies are lost, as a result of the cutting off of the fetal circulation due to separation of the placenta.

Treatment—During early pregnancy, soon after the formation of the placenta, and while the uterus is still small, a slight separation of the placenta, may occur, which may produce so slight a disturbance that under the influence of rest in bed, and opiates, the pregnancy may not be interfered with. In the presence of bleeding which results in any elevation of pulse, however, the prompt emptying of the uterus will give the best results. At this period of the pregnancy the capacity of the uterus is so small that the danger of concealed hemorrhage is slight. The methods of emptying the uterus at this period of pregnancy will be discussed under the heading of "Therapeutic Abortion."

During late pregnancy and labor the indication is to empty the uterus at once. If the cervix is dilated or dilatable, the uterus can be easily and promptly emptied by version and extraction, after first having dilated the cervix manually. If the **cervix is not dilated and is rigid** and non-dilatable, vaginal Caesarian section offers a rapid and valuable means of securing complete dilatation. Version and extraction usually is the method of choice in emptying the uterus in these cases.

(Note.—Vaginal Caesarian is not a method of delivery. It is only a method of securing complete dilation.) Abdominal Caesarian section may be selected if the patient is in a properly equipped hospital, but does not give good results, since the patient is already in shock when the indication for operation arises.

After delivery of the child, the placenta should be removed manually and the uterus tightly packed with

gauze. Active treatment for hemorrhage and shock should not be neglected.

PUERPERAL HEMORRHAGES

Definition—All profuse hemorrhages from the parturient canal occurring after the first twenty-four hours, and during the puerperium.

Etiology—(1) The most common cause is retention of small portion of the placenta or membranes, blood clot, etc. (2) Deficient coagulability of the blood is a not infrequent cause. (3) Tumors of the birth canal, pedunculated fibroids, etc. (4) Injuries of the parturient canal.

Treatment—This will, of course, depend upon the cause. Since a large majority of the puerperal hemorrhages are due to retention of something within the cavity of the uterus, the use of Ergot or Pituitary Extract, in small doses over a period of several days, will give good results. The use of the curette is not advised. Any good results which might follow curettage may be obtained by other means, and the patient not subjected to the dangers which far too frequently follow the use of this dangerous instrument. If the hemorrhage is sufficient in amount to require active treatment, the uterine cavity and cervix are to be packed with a narrow gauze trailer, which has been wrung dry after having been placed in Tr. Iodine or ½% Formaldehyde. The trailer should be removed in 24 hours. This is usually sufficient to control the hemorrhage, but occasionally the treatment may have to be repeated. The coagulation time of the blood should always be tested, and, if indicated, normal, serum given in 10 cc. or 20 cc. doses gives good results. The usual precautions against anaphylaxis should be taken.

In about 5% of all cases there is some staining in the third or fourth week of the puerperium. This may be controlled with ergot.

POST-PARTUM HEMORRHAGE

Definition—Hemorrhage from the genital tract, occurring during the first 24 hours after delivery. (Note.—The loss of 16 ounces of blood, or less, during labor, is considered normal.)

Varieties—**Primary post-partum hemorrhage** is a term applied if the hemorrhage occurs during the first hour after delivery. **Secondary post-partum hemorrhage** is a term applied if the hemorrhage occurs after the first hour following delivery, and within the first twenty-

four hours. The primary type is by far the most frequent.

Sources of the Hemorrhage—(1) Placental site, commonest. (2) Lacerations of lower uterine segment, cervix, vagina, perineum, and vulva. (Note.—A common source in lacerations of the vulva is rupture of the arteries supplying the clitoris.)

Etiology—(1) A failure of the uterus to normally contract, and retract, after delivery. This may be due to one of the following factors: (a) An overstretched muscle, as in multiple pregnancy or polyhydramnion. (c) A poorly developed muscle. (d) An atony of the muscle as in rapidly succeeding pregnancies. (e) Atony due to too rapid emptying of the uterus. (f) **Mechanical interference** with normal contraction. This is the commonest cause of a failure of the uterus to normally contract. The presence of anything in the uterine cavity, whether it be a fibroid, a portion of the placenta, or a blood clot, interferes with normal contraction and so predisposes to hemorrhage. (g) Abnormally situated placental site, as in placenta previa. In this condition the dilated uterine sinuses are in the lower uterine segment, which has little contractile power. (h) Decreased contractile power resulting from prolonged anaesthesia.

(2) Lacerations of the genital tract.

(3) The foremost exciting cause is unskillful management of the third stage of labor, as in the employment of Crede's expression of the placenta, either too early or too forcibly.

Mechanism of the control of bleeding after separation and expulsion of the placenta—The dilated uterine sinuses are surrounded by longitudinal and circular muscle fibers. As these fibers contract and retract the lumina of the vessels are closed. Thrombosis in the uterine sinuses is favored by the increased coagulability of the blood in the latter months of pregnancy, and in labor by the leucocytosis and emigration of leucocytes into the connective tissue surrounding the uterine sinuses.

Diagnosis—The hemorrhage may be concealed at first, owing to bleeding into a relaxed uterus. The first evidence of post-partum hemorrhage is a freer discharge of blood than normal. This often appears as a gush of blood, but may be a continuous trickle. Later symptoms, in severe cases coming on very rapidly, are pallor, rapid pulse, dyspnoea, cold sweats and restlessness.

The diagnosis as to the source of the bleeding is of great importance. If the fundus is not firm and compression of it expels clots of fluid blood, the source of the hemorrhage is the relaxed uterine body, i. e., the placental site. Excessive flow, with firm uterine contraction does not proceed from the uterine cavity; it is due to laceration of the genital tract.

Prognosis—A woman may bleed to death in three to five minutes, if treatment is not instituted. If the case is properly managed, and the hemorrhage promptly

checked, the prognosis should be very good.

Prophylaxis—(1) Proper supervision during pregnancy. Good hygiene. (2) Proper management of the first and second stages of labor. (3) Prolonged anaesthesia to be avoided. Chloroform is especially dangerous, in predisposing towards relaxation of the uterus. Ether is never given until the second stage is well advanced. (4) Pituitrin should never be given except upon some definite indication, and then only if there is complete dilatation and an engaged head. Its dangers are twofold. It causes lacerations of the cervix and perineum, and through the too rapid emptying of the uterus, predisposes towards relaxation of the uterus. (5) An assistant should follow down the fundus during delivery, and should control the fundus by holding it gently, using sufficient manipulation to prevent ballooning. This control of the fundus should continue until one hour after the birth of the child, in a normal case. (6)No attempt to express the placenta should be made for at least twenty minutes after delivery, except in the presence of hemorrhage. If the placenta has not separated, at least one hour should elapse before forcible expression (Crede) is attempted. (7) Neither "early expression" nor Crede should be performed unless the uterus is well contracted. (8) The placenta and membranes should always be examined to see that they are intact. Placental tissue larger than a walnut, or membranes greater in size than the palm of the hand, should be removed manually, under strict aseptic precautions. (9) Lacerations should be repaired after delivery. (10) Give no ergot before the expulsion of the placenta.

Treatment—Hemorrhage from Relaxed Uterus. First: Grasp the fundus through the abdominal wall, and if it is not found well contracted, massage it until it contracts firmly, and expels its contents. **Second:** Give the patient fluid ext. ergot, dram 1, by mouth, or 1 cc. of ergot aseptic by hypodermic. The use of pituitary extract will produce a firm contraction very quickly, but the action of the drug disappears very rapidly, and should be reinforced with ergot. **Third:** Elevation of the foot of the bed. The patient's feet should be from 12 to 15 inches higher than her head. **Fourth:** Place patient upon operating table, and prepare surgically. If bleeding cannot be controlled by massage, ergot and

posture, there is an indication to explore the cavity in order to be sure that it is empty. Do not allow this emergency to affect your asepsis. Remember that after hemorrhage the patient's resistance will be low, and she will likely become infected unless you are surgically clean. There is no advantage in extremely rapid work in emergencies, where asepsis is a factor. Remove all retained placental tissue, membranes and blood clots. **Fifth:** If these measures are unavailing, the uterus is to be packed with sterile gauze. At least 12 yards of gauze, ½ yard in width and folded to 2 inches, are used. Gauze for uterine tampon is subjected to fractional sterilization, and kept in Mason jars or 2-inch test tubes. Pack only by touch. One hand is passed up to the fundus, which is kept contracted by an assistant. With the other hand the operator passes the gauze from the container to the internal hand, with a De Lee uterine dressing forceps. The gauze is tightly packed into the horns of the uterus, cavity, lower uterine segment, and vagina, by the internal hand. The pack is removed in twenty-four hours.

Drugs—Preparations of ergot and extract of pituitary body are of service. They should always be given hypodermically in the presence of hemorrhage. Aseptic ergot, made of Parke, Davis, and Ernutin, by Burroughs-Wellcome, are the best preparations of ergot. Ergotole has proven very unsatisfactory in the hands of the author.

Douches—Nearly all authors recommend the use of a hot douche as a means of controlling post-partum hemorrhage. The temperature of the douche should be 120 degrees F. of normal salt solution, or 1% of acetic acid in sterile water. In my opinion the use of a douche in the treatment of post-partum hemorrhage is a fallacy. If stimulation alone is sufficient to control the hemorrhage, massage will accomplish as much as the douche. On the other hand, if active treatment is required, I do not believe in losing valuable time in "trying out" a procedure which frequently fails. For that reason I omit the douche, and pack the uterus if the hemorrhage is at all alarming.

Hemorrhage from laceration is controlled by suturing the lacerations.

SECTION II

Pathological Labor

CHAPTER 7

Anomalies of the Expulsive Powers

UTERINE INERTIA

Primary uterine inertia—Pains are weak, few and at relatively long intervals, from the beginning of labor and gradually cease altogether.

Etiology—(1) Defective development of uterine muscle. (2) Acquired weakness due to constitutional disease, as in Tbc. (3) Overdistention of uterine muscle, as in twins, polyhydramnion. (4) Fatigue of uterine muscle, in rapidly succeeding pregnancies. (5) Abnormal positions, as face, breech, occipitoposterior. (6) Distended bladder or rectum, interfering with uterine action. (7) Degeneration of uterine muscle, metritis, fibroids, etc.

Secondary uterine inertia—Pains are at first very effective, but cease before delivery owing to uterine exhaustion.

Etiology—(1) The etiological factors given for primary uterine inertia may be effective. (2) In addition there is exhaustion due to tough membranes, slight obstruction of the canal, rigidity of the cervix, absence of hydrostatic wedge, caused by premature rupture of the membranes.
In a secondary inertia, then, we have a uterus which, although primarily weak, is at the same time capable of partially completing dilation and the expulsion of the fetus before its power falls. The failure may take place in either the first or second stage.

Results of Inertia—Danger to the fetus, through interference with the fetal circulation; damage to the maternal soft parts due to pressure, with resulting sloughs, fistulae and increased liability to infection; exhaustion of maternal nervous system, with prolonged convalescence. Danger to the mother also on account of atonic post-partum hemorrhage.

Treatment

Prophylactic—(1) Careful preliminary physical examination of every case during pregnancy, to discover conditions which might predispose. Anemias are treated vigorously. (2) Rigid supervision of the hygiene of pregnancy. (3) Strychnine, gr. 1/30 t. i. d. for the last three or four weeks of pregnancy, seems to help in cases where an inertia is to be expected.

During Labor—In every labor in which there are pains and no advance of the presenting part, **it is absolutely essential** to make an accurate diagnosis of presentation and position, relative size of birth canal as compared to presenting part, condition of mother, as shown by pulse and temperature, condition of fetus as shown by fetal heart.

Drugs—Therapy—In the primary type, especially in cases in which pain acts as an inhibitory impulse, preventing normal uterine contractions, during the first stage morphine, gr. ¼ repeated in thirty minutes, will give the patient rest, after which strong contractions usually begin. The morphine may be combined with 45 grains of sodium bromide, with good results. Opiates should be given only in first stage. In the secondary type rest is absolutely essential unless there is an indication to deliver, either on the part of the mother or the child. If after a good rest efficient pains are not established, stimulation of uterine contractions by the use of drugs or a colpeurynter is indicated. Pituitrin is only given when the head is well engaged, the membranes ruptured, the cervix effaced and completely dilated (in a multiparae a soft cervix dilated to four fingers is considered complete), and absolutely no disproportion between the fetus and the birth canal. Not more than ½ cc should be given at the first dose. May be repeated every half hour for two or three doses.

The colpeurynter is indicated in either type of inertia, with or without rupture of the membranes during the first stage.

Artificial rupture of the membranes is indicated in a primipara with complete dilation, or in a multipara with a soft effaced cervix dilated to four fingers.

Instrumental delivery is only indicated by evidences of fetal asphyxia, or maternal exhaustion. Maternal exhaustion is never diagnosed by subjective symptoms, but only upon elevation of temp. (99) or pulse (110-120).

TETANIC CONTRACTION OF THE UTERUS

Def.—Uterine contractions which have become very severe and continuous, instead of rythmical and intermittant.

Etiology—(1) Obstructed labor. (2) Administration of ergot before delivery of placenta. (3) Premature attempts at delivery before complete dilatation. (4) Use of pituitrin in presence of contraindications.

Dangers—Condition is one of great danger to the mother, through exhaustion, which predisposes to sepsis; through the danger of rupture of the uterus; and through trauma. It is of even greater danger to the child, which in nearly every case dies of asphyxia due to the interference with the placental circulation, and as a result of direct pressure upon its body.

Course of Labor—The labor usually begins normally, but as a result of one or more of the etiological factors causing this condition, the contractions increase in length, intensity and frequency, the intervals become shorter, until finally successive contractions can no longer be distinguished and the uterus assumes a state of continuous contraction. Rupture of the uterus inevitably occurs if prompt and well directed treatment is not instituted at once.

Symptoms—Rapid exhaustion, with rising pulse and temperature—anxious face—pain in abdomen—restlessness—vomiting—abdomen very tender—uterus hard and boardlike, obscuring foetal outline—fetal heart very rapid or absent—ring of Bandl, a groove running obliquely from mid point of Poupart's ligament to a point on mid-line between symphysis and umbilicus. Bandl's ring divides the upper from the lower uterine segment, and rises higher and higher until before rupture of the uterus occurs its highest point is at or above the umbilicus. Great edema of cervix, vagina and vulva. Large caput.

Diagnosis—History of labor, and symptoms as given.

Tetanic contraction		Secondary inertia
Gradually increasing in severity		Decreasing in severity
Hard, boardlike, tender	Uterus	Soft, flaccid, not tender
Parts not palpable, dying	Fetus	Parts palpable, living
Rising to 110-120	Pulse	Normal
Present	Bandl ring	Absent
Swollen, blue black	Cervix	Normal
Swollen, discolored, hot dry	Vagina	Normal

Bandl's ring		Distended bladder
Of tetanic contraction	History	Not significant
Given above	Findings	Abdomen soft, some tenderness, fluctuation

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Alarming	Condition	Good
No change	Catheter	Disappears

Treatment—Immediate delivery under surgical anaesthesia. A hypo of Morphine, gr. ½, may be given with advantage as soon as the condition is diagnosed as a prophylactic against rupture of the uterus occuring while preparations for delivery are being completed.

IRREGULAR CONTRACTIONS

(Hour glass contraction of uterus)

Def.—A localized thickening of the uterine wall, due to the contraction of the circular fibers.

Etiology—(1) Administration of ergot before delivery of placenta, by far the most common cause. (2) Fibroids. (3) Rarely, metritis, irritability of uterine muscle and malpositions.

Time of Occurence—Usually occurs in the third stage. Rarely in first or second stage.

Clinical Phenomena—In the first and second stages, the labor is prolonged, but patient is usually in good condition. Abdominal examination does not disclose anything of importance, but vaginally we note that the presenting part is not forced down into the pelvis and that there is no distention of the lower uterine segment. The presenting part may be wholly above the contracted ring, or the head may be below the ring which is gripping the infant about the neck.

In the third stage (commonest) there is delay in the expulsion of the placenta, and manual expression or Crede are not effective.

Diagnosis—In the first and second stages the condition must be thought of as a cause of non-advance. The diagnosis can only be made by the introduction of a hand into vagina or uterus. A localized annular band or contraction of the uterus, either above or below the presenting part, is found.

In the third stage the diagnosis is made in the same way.

The condition is usually discovered when, as a result of some indication for delivery, of either the fetus or placenta, the patient is anaesthetized and a hand is introduced into the birth canal as a preliminary to some operation. As stated, this leads to the discovery of the condition.

The contraction may be distinguished from Bandl's ring through consideration of the symptoms given under that heading.

Treatment—Under anaesthesia, the manual dilatation of the ring, followed by delivery as indicated by the conditions present.

PRECIPITATE LABOR

Def.—Type of labor terminated in few minutes witb very small number of pains.

Causes—(1) Relatively strong expulsive powers. (2) Relatively weak resistance of soft parts. (3) Relatively small body to be expelled. In some cases of apparent precipitate labor, patient's sensibility to pain is so dulled that she does not realize that the baby is being born, and consequently describes the labor as being unduly short.

Dangers—The greatest danger is usually fetal, from the child falling upon the ground or hard floor, from rupture of the cord and subsequent hemorrhage, or from the baby being deposited in basin of a water closet.

The danger to the mother results from lacerations, from the likelihood of postpartum hemorrhage following sudden emptying of the uterus, and from syncope resulting from the same cause.

CHAPTER 8

Anomalies of the Passages

A. Anomalies of the Soft Parts

AFFECTIONS OF VULVA

Resistant Hymen occasionally causes some delay at the outlet, and rarely requires incision.

Traumatic Stenosis

Etiology—Previous lacerations with extensive scar tissue formation, burns of the vulva, laceration especially as a result of falling on sharp objects, as picket of picket fence.

Treatment—If any delay at the outlet is caused by the condition, episiotomy is indicated.

Rigid Vulvar Orifice

Etiology—Elderly primiparae, horseback riders.

Treatment—Episiotomy.

Edema of the Vulva

Etiology—Arises as result of general condition as in nephritis, eclampsia, etc., or as a result of pressure, as in a long, dry labor, especially in cases in which the presenting part remains in the cavity of the pelvis over a long period of time.

Treatment—During pregnancy edema of the vulva should always call attention to a general toxemia, and treatment directly to the cause, rather than to the local condition.

During labor, as a prophylactic measure the head should not be allowed to remain in the cavity, during the second stage, for more than two and one-half hours, without advance. A forceps operation, with episiotomy, is almost always indicated. Lacerations in these cases are extensive, and delivery should be slow and careful. It is often wise to do double episiotomy. Lacerations should not be repaired before the third day, if marked edema is present. Operation even at this time is frequently unsuccessful.

AFFECTIONS OF VAGINA

Stenosis of the Vagina

Etiology—May be congenital, or acquired as the result of puerperal inflammatory lesions, injections of corrosive fluids, scar tissue, formation following extensive lacerations, scars following operative work on vagina.

Congenital type—In the most common form there is a transverse perforated diaphragm stretched across the vagina at about the junction of the upper third and middle third. In other forms there may be a longitudinal septum, forming a double vagina.

Treatment—While stenosis frequently suggests the necessity for a Cesarian Section, clinically we know that a very great majority of the acquired type will soften and dilate sufficiently to permit a spontaneous delivery. The use of a soft rubber colpeurynter, in the vagina, is advisable if the scar tissue does not soften during early labor. In some cases it may be necessary to incise the contracted area, making several longitudinal incisions in the vagina.

There is usually very little trouble in the congenital type, but in some instances it may become necessary to make a crucial incision in the transverse type of diaphragm, or a complete longitudinal incision of the type in which a longitudinal septum is found.

Cesarian section should be reserved for cases in which it is manifestly impossible to deliver intact a child through the vagina. It is, however, better ob-

stetrics to do a Cesarian in these cases, than deliver through the natural passages at the expense of the maternal tissues, if there is reason to believe that lacerations may prove extensive and perhaps involve the broad ligaments or the peritoneal cavity.

Vaginal Tumors

Haematomata are the most common vaginal tumors, but do not cause dystochia as often as do cysts, fibromata, or carcinomatous masses.

Treatment—If large enough to obstruct the canal cysts or fibromata should be removed.

In carcinoma involving vagina the case is inoperable and Cesarian section usually gives the mother a chance of survival for several months. Vaginal delivery in carcinoma of the vagina and cervix usually results in maternal death from hemorrhage and sepsis.

Hematomata should not be treated surgically unless it is impossible to deliver otherwise, when they may be incised, clot turned out and packed to control hemorrhage. They invariably become infected after they are opened.

Cystocele and Rectocele

Rarely cause dystochia. Cystocele may be replaced manually after catherterization. Rectocele is replaced in the Sim's position. Rarely forceps have been used to complete the delivery.

AFFECTIONS OF THE CERVIX

Conglutinatio Cervicis

Syn.—Atresia of cervix.

Def.—A condition in which the external os is firmly glued together with fine adhesions, so that there is no dilatation.

Etiology—Sometimes occurs as a persistence of the "pin point os" or may be acquired from caustic applications used during early pregnancy in an effort to produce an abortion. It is evident that there was an opening present when impregnation occurred, and that the present atresia is the result of inflammation of the cervical canal which has taken place since.

Diagnosis—Upon vaginal examination no cervix and no external os is detected but a thin diaphragm stretching across the vaginal vault separates the presenting part from the examining fingers.

Frequently a diagnosis of complete dilatation and tough non-ruptured membranes is made. A careful

examination reveals an area representing the cervix in which the site of the os is felt as a tiny ring. Occasionally the vaginal speculum must be used, when the os will be seen as a tiny point surrounded by a red ring.

Treatment—Under anaesthesia the forefinger can usually be forced through the os. Dilatation then goes on very rapidly and is frequently completed in five or ten minutes. It is occasionally necessary to use some hard instrument such as a blunt hemastat, instead of the finger.

Rigidity of Cervix

Etiology—Atrophic changes, especially in aged primaparae, cicatrices following injuries in previous difficult labors, and from faulty development. Spasmodic rigidity is frequently found in cases in which pain acts as an inhibition to uterine contractions, and reflexly causes a spasm of the cervix.

Diagnosis—Scars and developmental defects are usually easy to recognize. In the absence of these it is usually safe to assume that the rigidity will disappear if the patient is given a period of rest, followed by a further test of labor.

Treatment—If there is no indication on the part of the mother or child for rapid delivery, the use of hypnotics will give good results. The patient will, after three or four hours of rest, frequently renew her labor with vigor and rapidly complete her first stage. The use of morphine in these cases gives particularly good results. It is best given by hypo. ¼ grain at the first dose, repeated in 30 minutes if the patient is not asleep. Chloral, given by rectum, in three 15 or 20 grain doses at 20 minute intervals, is recommended by most authors. It causes degenerative changes in the liver, and in my opinion should not be used. It is particularly contraindicated in the toxemias of pregnancy.

After this rest pains are usually established, but if it is desired to stimulate contractions the use of a Voorhees bag gives excellent results. The colpeurynter not only stimulates contractions, but also softens and dilates the cervix.

If there is an indication for rapid delivery, on the part of the mother or child, the selection of the operation depends upon conditions present, and will be discussed later.

Adhesions of Membranes to Cervix

In this condition the membranes are adherent to the internal os, and as a result there is interference with dilatation and effacement.

Diagnosis—Successive vaginal examinations show no progress in dilation, in spite of seemingly strong uterine contractions. If the examining finger is swept around the internal os, between the membranes and the cervix, the presence of one or more bands of adhesions, firmly fixing the membranes to the internal os, will be detected.

Treatment—The adhesions can usually be separated by the examining finger. If possible, avoid rupturing the membranes, but if this cannot be done, artificial rupture of the membranes is indicated. In separating adhesions, it is best to be sure that membranes are free from attachment to any portion of lower uterine segment within an inch and one-half above the internal os. If adhesions cannot be separated, and artificial rupture of the membranes is necessary, the use of the colpeurynter will be attended with marked shortening of the labor.

Edema of the Cervix

Clinical Phenomena—Occasionally before dilatation is completed, the cervix may be caught between the fetal head and the anterior pelvic wall. It then becomes swollen and may prolapse as a dark blue hemorrhagic mass.

Treatment—The protruding cervix is to be gently pushed up between the symphysis and the head, during the pain. Soon the head will slip down past it, and delivery will be rapidly completed.

Carcinoma of the Cervix

Dangers During Labor—(1) Hemorrhage. (2) Infection. (3) Obstruction due to nondilatation of cervix. (4) Deep tears.

Treatment—The treatment depends upon whether the carcinoma is operable or non-operable, and whether the child is alive or dead.

If the carcinoma is operable, the child should be delivered by Cesarian section, after which the growth should be dealt with by the radical operation.

If the carcinoma is inoperable, and the child alive, Cesarian section followed by supra-vaginal amputation,

is the method of choice. If the child is dead, and the cervix dilated or dilatable to such an extent that a crushed head can be extracted without extensive laceration, craniotomy should be performed. On the other hand, even with a dead baby, if craniotomy will result in laceration and bruising of the tumor, then because of the danger from hemorrhage and infection, it is safer to deliver by Cesarian, and follow by supravaginal hysterectomy.

DISPLACEMENTS OF THE UTERUS

Pendulous Abdomen—(Anteversion of Uterus)

Etiology—(1) Lack of tone in the uterine and abdominal walls, especially in multiparae in which pregnancies have rapidly succeeded one another. (2) Factors which prevent engagement, such as a contracted pelvic brim, or a disproportion between passenger and passage. (3) Shortening of the abdominal cavity, especially that which is associated with lumbar lordosis and descent of the thorax. (4) Over-distention, as in polyhydramnion, or twins.

Mechanical Effect—Uterine action forces the presenting part backwards, against the promontory, instead of downwards, in the axis of the birth canal. It is therefore mechanically impossible for the presenting part to descend, unless (1) the anteversion is corrected mechanically, or (2) as a result of strong pains, the presenting part is moulded so that it enters the pelvis.

Dangers—Delayed labor, delayed dilatation, malpositions of the fetus, abnormal mechanism, especially deep transverse arrest of the head.

Treatment

Prophylaxis—Prophylaxis should begin during the first pregnancy and puerperium. As soon as pregnancy is diagnosed the woman should discard her corsets and substitute a maternity corset or an abdominal supporter. The value of systematic exercise during pregnancy cannot be overestimated. Properly directed massage is of some benefit, but must not be substituted for active exercise. Prophylaxis during the puerperium is especially important, and consists principally of systematic exercise, to be begun not later than the fifth day postpartum. The object of these exercises is to stimulate normal involution of the abdominal muscles, which have been over-stretched during pregnancy. The following exercises are recommended:

1. Flex right thigh on abdomen, keeping leg flexed on thigh.

2. Flex left thigh as in 1.
3. Flex both thighs as in 1.
4. Flex right thigh on abdomen, keeping leg extended.
5. Flex left thigh as in 4.
6. Flex both thighs as in 4.
7. Resting upon shoulders, elbows and heels, attempt to raise the abdomen and pelvis free from bed.
8. Lying upon back, raise on elbow, partially turning or twisting the trunk as if preparing to eat from tray. Slowly.
9. Lying upon back, raise to sitting position, then return to original position.

Exercises should be taken twice each day, doing each exercise from three to twenty times. In perineorrhaphies the knees should be tied together, hence omitting 1, 2, 4 and 5.

During labor the treatment consists in the application of a very tight binder, of a width sufficient to extend from below the trochanters to a point just below the breasts. The object of this binder is to replace the anteverted uterus, and to provide an artificial abdominal wall. It should be applied at the beginning of labor, and retained during labor.

Retroverted Gravid Uterus and Anterior Sacculation

Etiology—(1) Commonest cause is a pregnancy occurring in a uterus already retroverted or retroflexed. (2) A chronic over-distention of the bladder. (3) Flat pelvis favors incarceration on account of projecting promontory.

Results—(1) The uterus may correct its malposition as pregnancy advances. (2) The uterus may become incarcerated, the fundus being caught beneath the promontory of the sacrum, and prevented from rising out of the pelvis. If this condition is not rectified, (3) Abortion occurs. (4) Partial reposition may occur, with sacculation of the anterior wall. Here the posterior wall remains adherent in the pelvis and the anterior wall is stretched upward as the growth of the fetus continues.

Symptoms—Difficulty in passing urine, with pain, are usually the first symptoms. Constipation is always present, and becomes worse as the condition progresses. Reflex symptoms of nausea and vomiting are nearly always marked. As the pressure on the bladder continues, a severe cystitis results, which may go on to a necrosis of the bladder. The bladder is always over-distended and frequently reaches the umbilicus.

Signs—(1) Soft bulging mass in cul-de-sac. (2) Cervix displaced anteriorly, and frequently points upward. It is continuous with the mass in the posterior fornix. The anterior uterine wall feels thinned out. By rectum a more satisfactory palpation of the retroverted uterus is possible.

Diagnosis—Typically, a patient three or four months pregnant, with great pain and retention of urine, and the "signs" given.

Differential Diagnosis—(a) **Fibroid in posterior wall.** No signs of pregnancy, normal menstruation or irregular hemorrhages, retention of urine uncommon, cervix is pushed forward and may be raised, **but usually looks downward and backwards in normal position,** consistency of fibroid hard.

(b) **Fibroid in posterior wall of pregnant uterus,** cervix in normal position, fibroid may be softer when associated with pregnancy. Usually possible to palpate groove between enlarged uterus and fibroid.

Treatment

Prophylaxis—A routine pelvic examination should be made of each pregnant woman during the second or third month. If the uterus is found retroverted and movable, its position should be corrected, and a pessary used to maintain it in normal position until it rises out of the pelvis in the third or fourth month. A Hoffman inflated rubber pessary will give the best results in these cases. They may be obtained in several sizes. If the uterus is fixed, an attempt at reposition may be made, with the patient in the knee chest position, using great care and gentleness, in order to avoid the induction of an abortion. If this reposition is not successful, a general anaesthetic should be used. Under anaesthesia it is almost always possible to replace the uterus up to the end of the third month, unless it is adherent.

Curative treatment is imperative when incarceration of uterus with bladder disturbances and sacculation of the anterior wall has already occurred. The bladder must be kept empty with catheter, and reposition under anaesthesia attempted. If this fails there are two courses open: Either to do a therapeutic abortion, or to open the abdomen, free the uterus and replace. This is frequently successful, a large percentage of the cases going through their pregnancy to full term. Oc-

casionally these cases reach full term. In this case we have an extremely thin anterior uterine wall, a very thick posterior uterine wall, which obstructs the parturient canal, and a cervix which is frequently drawn up anteriorly above the symphysis. Uterine contractions are inefficient, and if Pituitrin or other similar medication is used, rupture of the uterus results. There is seldom any dilation of the cervix, even after prolonged labor. Cesarian section offers the best chance for both mother and child.

POSTERIOR SACCULATION

A sacculation of the posterior uterine wall results from any factor which produces a restriction in the expansion of the anterior uterine wall, just as an anterior sacculation results from the restriction of expansion of the posterior wall, in the condition just discussed.

Etiology—Results from a fixation of the uterus to the anterior abdominal wall. Although it was formerly thought that the operation known as a ventral suspension would not cause the interference with pregnancy and labor which had been observed after ventral fixation, it has been found that the suspension frequently becomes a fixation, regardless of the technique employed, and hence neither operation is safe during the child-bearing age.

Pathology—If the adhesions between the uterus and belly wall stretch sufficiently to permit normal expansion of the uterus during pregnancy, little trouble will result. On the other hand, if the fundus is firmly fixed to the belly wall, only that portion of the uterus above and behind this fixed point, can expand to permit the increase in size of the uterine contents. This results in an expansion of the posterior wall, called a sacculation, and a thickening of the anterior uterine wall below the fixed point. This thickening frequently forms a tumor obstructing the parturient canal.

Diagnosis—The condition rarely gives symptoms during pregnancy, and it is not until labor begins that active treatment is required. The history of an operation, by finding the cervix displaced backwards and upwards, frequently above the promontory of the sacrum, the palpation of the thickened anterior uterine wall filling the inlet, are sufficient to determine the condition.

Results—While it is true that many women upon whom these operations have been performed, pass through a normal pregnancy and a spontaneous delivery, yet we should never fail, while taking our history, to enquire about previous operations, and in the event of

a fixation or a suspension having been done, should insist on the patient being in a hospital for delivery. Delayed labor, interference with dilatation, malposition, are all common.

Treatment—In the event of a serious dystochia resulting from this condition, Cesarian is advised. If the cervix is accessible, it may be possible to dilate manually, under anaesthesia, and deliver vaginally, but on account of the danger of rupture of the uterus, this is seldom advisable.

Prolapse of the Uterus

Etiology—This is a gynecological condition, complicated with pregnancy. Even complete prolapse is not a bar to conception. Usually, however, the prolapse may originate during the pregnancy from lack of support in the pelvic floor, and increased weight and pressure from above.

Symptoms—Patient makes the diagnosis, by saying that her womb comes out. Interference with urination, bearing down and backache, pain and tenderness locally, are frequent symptoms.

Signs—Upon coughing or bearing down, the cervix appears at the vulva. If the condition has persisted for some time, the cervical mucous membrane is hard and cracked, discolored, and frequently bleeding. In marked cases the cervix may remain outside of the vulva continuously.

Results—Many of these cases correct themselves spontaneously during the seventh month. Abortion often occurs. Local inflammatory conditions, resulting from the exposure of cervical and vaginal mucous membrane, are always present to some degree.

Treatment—This condition is not an indication for therapeutic abortion. The uterus should be replaced and patient kept in bed, in the horizontal position, for several days, the length of time depending upon the local condition. The uterus can then be retained in its position with a suitable pessary. Usually a Hoffman inflated rubber pessary meets the conditions best, but occasionally an inflated ring pessary, largest size, will be required. The pessary should be removed, by the physician, every two weeks, for cleaning. It should not be permanently removed before the early part of the seventh month.

In some cases the tendency to a recurrence of a prolapse is so great that during the last weeks of the pregnancy the patient has to be kept in bed most of

the time, allowing her to be up for a period of a few hours, with the support of a firm T bandage.

TUMORS OF THE UTERUS

Fibromyomata

The most common tumor causing dystochia is a fibroid of the uterus.

Effect of Pregnancy upon the Fibroid—(1) Fibroids as a rule increase in size during pregnancy, either as a result of hypertrophy, or hyperplasia, or edema. (2) They change position. There is as a general rule a gradual elevation of the fibroid, which although at the beginning of pregnancy may be situated low in the pelvis, threatening marked obstruction during delivery, at term is frequently found lying above the brim, and causing no marked effect upon labor. This is due to either (a) increase in size of the tumor, or (b) increase in size of the uterus, or (c) retraction of the cervix and lower uterine segment during effacement. (3) Fibroids become softer during pregnancy, as a result of the increased blood supply. (4) Pathological changes may occur as a result of pregnancy. Thus as a result of pressure, which interferes with the blood supply, the tumor may become necrotic or gangrenous. This is particularly true of pedunculated fibroids with twisted pedicles, but occurs in any variety. As a result of disturbed nutrition it may undergo fatty or myxomatous degeneration, or may become edematous. Any degeneration predisposes to infection, and if thus infected the fibroid may go on to suppuration and cause death during the puerperium.

Effect of Fibroids upon Pregnancy and Labor—(1) Sterility is common among women having fibroids. The sterility depends upon the location and size of the tumor, the condition of the endometrium, tubes and ovaries. The subserous variety has little effect upon fertility; the interstitial type almost invariably results in sterility, on account of the destruction of the endometrium by the growing tumor, and pregnancy is rarely associated with the submucous type. The function of tubes and ovaries is usually interfered with, on account of congestion and inflammatory changes. (2) Abortion and premature labor are common on account of the destruction of endometrium and decidua, as a result of the encroachment of the tumor upon the uterine

cavity, particularly in large interstitial fibroids, and any submucous fibroid. (3) Pressure symptoms are common. (4) **During labor,** the fibroid may (a) interfere with uterine contractions, causing a uterine inertia, with tedious labor, and atonic postpartum hemorrhage. (b) Malpositions and presentations, and prolapse of the cord, are common. (c) Actual obstruction depends upon the site of the tumor. If the fibroid is above the cervix or lower uterine segment, the passage is not obstructed unless it is subperitoneal with a long pedicle, which allows it to descend into the pelvis. If situated in the cervix or lower uterine segment spontaneous labor is only possible when the tumor is (a) small, or (b) ascends into the abdomen, or (c) descends out of the pelvis, as in a pedunculated submucous fibroid.

Effect of Fibroids upon the Puerperium—(1) After pains increased in severity, since the uterus cannot contract normally. (2) Lochia increased in amount and duration, from interference with normal uterine contraction. (3) Increased tendency towards puerpal sepsis, as a result of degenerative changes in the tumor.

Diagnosis—(1) The growth is more rapid than that of a fibromyoma not associated with pregnancy. It is usually best to make a careful examination, recording height of fundus, and instruct the patient to return in one month for diagnosis. **No other tumor grows as fast as does the pregnant uterus.** (2) Cervix assumes the characteristic of the pregnant condition, i. e., softening. (3) Areas of softening appear in uterine body. (4) The ability to elicit fetal heart tones, and to observe fetal movements, is final. (5) in difficult cases the X-ray, after the fifth lunar month, will often result in a positive diagnosis. (6) Breast changes, menstrual history and similar signs, are of no value in diagnosis.

Treatment—Prophylaxis—On account of the tremendous mortality resulting from pregnancy complicated with fibroids, therapeutic prevention of conception should always be advised except in very small subperitoneal fibroids, which are causing no symptoms and whose site renders possible the assumption that they will cause no obstruction to delivery. In general, operation should be advised in every woman with fibroids of the uterus diagnosed during the child-bearing period. If the tumor is large enough to produce symptoms and yet is so situated that it cannot be removed without

removing the body of the uterus, supravaginal hysterectomy, leaving tubes, ovaries and cervix, is advisable.

Treatment During Pregnancy—In all cases presenting no symptoms, the policy of watchful expectancy gives best results. A pedunculated submucous fibroid projecting from the cervix should be removed in the hope that such operation will not interfere with pregnancy. If a subserous pedunculated fibroid gives signs of twisted pedicle, abdomen should be opened, fibroid removed, and pregnancy not interfered with. Abortion does not usually take place following these operations. If hemorrhage, severe pain, or marked pressure symptoms are present, operation, usually a hysterectomy, is indicated.

Therapeutic abortion, on account of hemorrhage and sepsis, has a very high mortality in these cases, and is rarely indicated.

Treatment During Labor—If there is no pelvic obstruction, the treatment should be expectant, but the possibility of malpresentations, hemorrhage and retained placenta, should not be forgotten. If the pelvic tumor is apparently so large and so firmly fixed that delivery appears improbable or very difficult, Cesarian section is indicated.

If the tumor is of moderate size, causing only partial obstruction, the test of labor should be given in the hope that with the progress of dilatation and effacement it may rise above the pelvic brim.

Version and forceps are indicated only in cases in which the obstruction is comparatively slight.

Pedunculated tumors that are accessible should be extirpated early in labor.

During the puerperium the administration of Flx. Ergot, ½ dram t.i.d., will decrease the hemorrhage and promote involution. The tumor should not be operated during the puerperium, unless indicated by sepsis, hemorrhage or pressure symptoms.

Ovarian Tumors

These tumors cause more serious complications during pregnancy and labor than do fibroids. The principal complications are serious dystochia, and degenerative changes in the tumor itself. They are less frequent than fibroids. Cysts are the common type, dermoids the most frequent form.

Effect upon Pregnancy—Abortion occurs in 17 per cent of pregnancies complicated with ovarian cyst. Serious accidents such as torsion of the pedicle of a cyst, intracystic hemorrhage, infection of cystic contents, and pressure symptoms, frequently occur. Aside from these accidents the presence of the tumor has little or no effect upon the pregnancy.

Effect upon Labor—When the tumor is abdominal, it may interfere with uterine contractions, and may cause such severe maternal dyspnoea that the labor must be terminated artificially without any mechanical obstruction as an indication.

When the tumor is in the pelvis, particularly in the intra-ligamentous cysts, it may cause marked obstruction.

Effect of Labor upon the Tumor—Abdominal tumors usually undergo no change. Pelvic tumors may be compressed, and may rupture or bleed into the cyst—the pedicle may become twisted during pregnancy or puerperium—and suppuration may take place, especially after labor.

Effect upon the Puerperium—The completion of labor does not mean that the woman has escaped the complications incident to this condition, for on account of bruising of the tumor its resistance is lowered, and there is consequently great danger of infection. The case must be carefully watched for signs of peritoneal irritation, such as acute pain, vomiting, tenderness over the tumor, temperature, and elevation of pulse, since this syndrome usually indicates that the circulation in the tumor has become obstructed. Immediate operation in the presence of this complication is indicated.

Diagnosis—There is usually a history of amenorrhoea. The consistency is elastic, its shape spherical or multilocular, its position is first at the side of the uterus, but as pregnancy advances or the cyst increases in size, it rises out of the pelvis and may appear to be in the midline. A careful examination, however, will usually reveal its attachment laterally to the uterus.

It is usually possible to palpate the normal pregnant uterus, in the midline, and the spherical, elastic cyst, separate from the uterus, and lateral to it. An anaesthetic may be necessary.

Consider carefully the possibility of polyhydramnion.

Treatment—During the first six months of the pregnancy, ovarian tumors should be removed as soon as diagnosis is made, on account of the large mortality resulting from complications arising during labor and the puerperium. Abortion follows 20 per cent of these operations, but this figure is not higher than is found when the tumor is not treated by operation. Therapeutic abortion, and tapping the cyst, are dangerous procedures on account of sepsis and degenerative changes which may follow.

During the last three months operation should only be done if indicated by complications.

During labor, if the tumor causes an irreductible obstruction, Cesarian section, followed by removal of the tumor, gives best results.

During the puerperium operation is only done if indicated by complications.

Distended Bladder

Etiology—Compression of the urethra between the fetal head and the symphysis.

Dangers—Overdistention of bladder, with sloughs, fistulae; prolonged labor, interference with normal mechanism of labor.

Diagnosis—The discovery of a tumor in lower abdomen, slightly tender, fluctuating, history of urination not conclusive. Differentiate from Bandl's ring. q.v.

Treatment—Catheterization.

CHAPTER 9

Anomalies of the Passages (Continued)

B. Anomalies of the Hard Parts (Deformed Pelves)

Just as it is nearly impossible to find two faces alike, so it is difficult to obtain two pelves alike in all particulars. This does not imply that the labors in the various pelves are essentially different. In many pelves differing from each other in shape and form spontaneous deliveries will occur. It is estimated that from 15 to 20 per cent of all pelves are deformed to a certain extent, but that only 3 to 5 per cent are causative of serious disturbances in labor. In other words, 15 to 20

per cent of pelves are anatomically deformed, while only 3 to 5 per cent are obstetrically abnormal. The deformed pelvis is one that produces a definite change in what we know as normal labor and it is with such that the obstetrician is directly concerned. In order to appreciate the changes in size and form of the deformed pelvis, a knowledge of the measurements of the normal standard pelvis as found in the living woman is essential.

STANDARD MEASUREMENTS—MATERNAL PELVIS

Obtainable by Pelvimetry

Interspinous—Between outer lips of iliac spines.....26 Cm

Intercrystal—Between outer edges of iliac crests at widest point .....29 Cm

Bitrochanteric—Between outer surfaces of large trochanters .....31 Cm

External Conjugate—Between depression beneath last lumbar spine and mid-point on anterior surface of symphysis, ½ inch below superior border .....20 Cm

Left External Oblique—Between left posterior superior iliac spine and right anterior superior iliac spine .....22 Cm

Right External Oblique—Between right posterior superior iliac spine and left anterior superior iliac spine .....22+ Cm

Circumference—Of a plane at right angles to long axis of body, half way between trochanters and iliac crests .....90 Cm

Antero-Posterior of Outlet—Between inferior surface of symphysis in the sub-pubic angle, in front, and the base of the coccyx on its external surface, behind. Note—This actually measures 12 Cm. normally, but from this must be subtracted 1 or 1.5 Cm. to allow for thickness of bone and soft parts, leaving an available diameter of.....11 Cm

Transverse of Outlet—Between inner borders of ischial tuberosities .....11 Cm

Anterior Sagittal of Outlet—Between inferior surface of the symphysis in the subpubic angle, and the middle of a line representing the transverse of the outlet ..... 6 Cm

Posterior Sagittal of Outlet—Between the middle of a line representing the transverse of the outlet, and the base of the coccyx on its external surface. Note—This actually measures 11 Cm. normally, but from this must be subtracted 1 or 1.5 Cm. to allow for thickness of bone and soft parts, leaving an available diameter of ..... 10 Cm

Diagonal Conjugate—Between anterior midpoint of promontory and midpoint of inferior border of pubic arch ..... 12.5 Cm

True Conjugate—Between anterior midpoint of promontory and midpoint of posterior superior border of symphysis. Note—Obtained by subtracting 1.5 to 2 Cm. from Diagonal Conjugate.. 11 Cm

Transverse of Cavity—Between tips of ischial spines ..... 11 Cm

Not Obtainable by Pelvimetry

Obliques of Superior Strait—Between sacro-iliac synchondrosis of one side and ilio-pectineal eminence of opposite side ..... 12 Cm

Transverse of Inlet—A transverse diameter between widest points of pelvic brim..... 13 Cm

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The size of the fetal head is an important factor in estimating the outcome of a given delivery, and as this varies in different labors, its accurate determination is of great value.

STANDARD MEASUREMENTS—FETUS AT TERM

Bitemporal Diameter—Greatest distance between temporal sutures ..... 8 Cm

Biparietal Diameter—Greatest transverse diameter, extending from one parietal boss to the other ..... 9¼ Cm

Suboccipito-Bregmatic Diameter—Between middle of large fontanelle and under surface of occipital bone, below the external occipital protuberance ..... 9½ Cm

Occipito-Frontal Diameter—Between root of nose and external occipital protuberance..... 12 Cm

Occipito-Mental Diameter—Between most prominent part of occiput and the center of the lower margin of the chin ..... 13½ Cm

Suboccipito-Frontal Diameter—Between junction of neck and occiput to root of nose (glabella)....11 Cm 10

Fronto-Mental Diameter—Between summit of forehead and center of lower margin of chin....8½ Cm

Cervico-Bregmatic Diameter (trachelo-bregmatic)—Between posterior angle of anterior fontanelle and anterior margin of foramen magnum..... 9 Cm

Sterno-Mental Diameter—Between episternal notch and center of lower margin of chin ..... 5 Cm

Bisacromial Diameter—Between acromian processes ..... 12 Cm 11.5

Suboccipito-Bregmatic Circumference ..... 32 Cm

Occipito-Frontal Circumference ..... 34 Cm 34.4

Bisacromial Circumference ..... 36 Cm 34.5

Dangers From Deformed Pelves

The maternal and especially the fetal mortality are increased in proportion to the extent of the deformity and the difficulty of delivery. The chief dangers are those of prolonged labor, to which are added those incident to operative intervention, malpresentation and malposition, which occur more frequently than in normal pelves, and prolapse of the cord, rupture of the uterus and postpartum hemorrhage.

SIMPLE FLAT PELVIS

The most common deformity observed in practice is known as the flat pelvis. (Simple and rachitic.)

Characteristics—The distinguishing feature of the simple flat pelvis is the sinking downward and inward of the sacrum between the innominate bones, into the pelvic cavity, **without** rotation upon its transverse axis. The normal vertical curve of the anterior surface of the sacrum is unaffected. As a result of this disturbance **all the antero-posterior diameters are decreased,** the conjugata vera being most markedly affected. The degree of shortening is only moderate, and the antero-posterior diameter of the inlet rarely falls below 8.5 Cm. Below this limit, the probability of rachitis is to be strongly suspected. The pelvic outlet is practically normal. A second or false promontory is commonly observed in this pelvis, due to the projection of cartilage between the first and second sacral vertebrae. The true conjugate must be measured from the midpoint on the anterior border of this false promon-

tory. Because of the anterior displacement of the sacrum, the posterior superior iliac spines may approach each other, and thus narrow the rhomboid of Michaelis.

Diagnosis—This anomaly may easily be overlooked unless both external and internal pelvimetry is made a matter of routine. All of the diameters are normal except the diagonal conjugate, and as a rule the external conjugate. The vaginal finger palpates the promontory with more ease than in a normal pelvis. An external conjugate of 18 Cm. or less in nearly every instance indicates a flat pelvis, but a normal external conjugate does not necessarily mean a normal pelvis, since in a certain number of cases the flattening can only be noted on internal examination.

A flat rachitic pelvis is distinguished from a simple flat by noting that in the simple flat there is no disturbance in the normal relation between the interspinous and the intercristal diameters, while in the rachitic type the interspinous and the intercristal do not vary from one another in length by more than 1-1½ Cm., and the intercristal may be equal to or greater than the interspinous.

RACHITIC FLAT PELVIS

Etiology—Rachitis, a disease of malnutrition.

Chief Factors Causing Deformity in Rickets—In rickets we have a pelvis which is more susceptible to the forces to which it is subjected than a normal pelvis. Thus as a result of extremely rapid proliferation of the cells about the periphery, we have irregularities, such as exostoses (rachitic rosary), and as a result of slow or deficient calcification we have softening of the bone. When this pliable pelvis is subjected to pressure from above, counterpressure from below, and traction by muscles and ligaments, there results irregularity in contour. If the disease existed only during pregnancy or in the first years of the child's life, the deformity will be less than is found when the active disease was present during late childhood, when the child is more active.

Characteristics—The sacrum as a whole is short, wide and thin. The sacral bodies are forced anteriorly, destroying the normal concavity of their anterior surfaces. In severe cases the anterior surface is convex from side to side. The sacrum frequently presents a sharp angle

near the fourth or fifth vertebra, above which the anterior surface is flattened and below which it may retain its concavity.

The sacrum is displaced anteriorly and downward into the cavity of the pelvis, and is rotated on its transverse axis so that the superior surface is directed anteriorly, and its anterior surface is directed downward. Thus in the erect position of the patient, the anterior surface lies in a horizontal direction and forms an acute angle with the lumbar vertebrae. Lordosis is common.

The iliac bones are flattened and are directed more anteriorly than normal. The posterior extremeties of the crests are drawn closer together behind the sacrum. The anterior portions are divergent, and the anterior superior spines are frequently the widest part of the crests. **This point is important.** The more the interspinous approaches, equals or exceeds the intercristal diameter, the greater is the probability of rickets. The increased lateral tension tends to draw the pubes towards the promontory and to destroy the angle between the two pubic bones.

The pelvic walls diverge below, and the tuberosities of the ischii are pulled outward and forward. This increases the bi-ischiatic diameter. The tuberosities are pulled outward by the action of the adductor muscles and forward by the traction of the rotators of the thigh. The ischial spines are also further apart, although they may be longer and project into the pelvic cavity. The length of the spines is a fair index of the forward descent of the promontory into the pelvis. The more the promontory falls forward the greater is the tension on the anterior sacro-sciatic ligaments, which are inserted into the spines. The greater the tension, the greater their development.

The acetabula are situated more on the antero-lateral walls and the bitrochanteric diameter is proportionately diminished.

The pubic arch is increased and its borders everted. The pelvic inlet becomes more reniform in outline. The transverse of the brim lies more posteriorly than normal and may be bisected by the sacral promontory. The available or obstetric transverse is somewhat increased and constitutes the longest diameter of the brim. This diameter increases in the cavity and reaches its maximum in the bi-ischiatic or transverse

of the outlet. The true conjugate may reach a minimum length of three or four centimeters. The anterior-posterior diameter increases in the cavity and reaches the normal at the outlet.

Diagnosis—A history that the patient had not, as child, begun to walk until later than usual, together with evidences of rachitis in other parts of the body, should call attention to the presence of the deformity in the pelvis. These evidences are small stature, short, thick, curved extremities, tibiae having sharp anterior borders, enlarged joints, rachitic rosary, brachycephalus. In addition the pelvis presents one characteristic, i. e., the interspinous approaches or exceeds the intercristal diameter. A difference of 1.5 Cm. or less, in the length of these diameters indicates a rachitic pelvis.

Late Rachitic Pelvis (Pseudo-Osteomalacic Pelvis)

This pelvis resembles very closely the osteomalacic deformity. The sacral promontory is sunk deeply into the pelvic inlet. The bodies of the vertebrae are forced far in front of their respective wings, thus exaggerating the usual rachitic change. The lower portion of the sacrum approaches the pubis and dimin ishes the size of the outlet. This latter movement causes a sharp angle or curve at the junction of the second and third sacral vertebrae. The acetabular portion of the iliac bones is bent internally from force applied through the femora. The outline of the pelvic brim resembles a triangle.

In this type, both inlet and outlet are decreased in size and the pelvic cavity possesses the largest measurements.

The changes are due to acute rachitis occurring after the child walks. The weight of the trunk and the counter-pressure through the femora are the main factors in its production. The lateral tension is ineffective. The large proportion of late rachitic pelves are unfit for obstetrical purposes, and when such a deformity complicates delivery at full time, a primary Cesarian section is indicated.

The diagnosis is made by applying the usual criteria of rachitis, i. e., the interspinous diameter approaches the intercristal, so that they do not differ by more than 1.5 Cm., and by finding evidences of rachitis in other parts of the body.

Influence of the Flat Pelvis on Labor

Before giving the mechanism of labor in a flat pelvis, it may be well to give a recapitulation of the mechanism in normal labor.

Mechanism of Normal Labor

If the pelvic and fetal measurements are approximately normal, and the powers of labor sufficient, we may expect the normal mechanism of labor to occur.

In a primipara, the fetal head becomes fixed in the inlet and often engaged in the cavity, several weeks before the onset of labor. The head is well flexed, and the examining finger palpates the posterior fontanelle with ease.

In a multipara, the head remains movable above the inlet and descends with uterine contractions, often when the membranes rupture. Before descent, the head lies more or less extended, but engagement necessitates the flexion observed in a primipara.

The head enters the inlet in the oblique diameter, and, because of the encroachment of the rectum in the left posterior segment, the right oblique is most often occupied by the sagittal suture. At times a lateral flexion is present, when the head lies nearer to one shoulder. This is called **asynclitism**, and disappears before descent takes place. The head enters so that the posterior fontanelle lies on a lower plane than the anterior fontanelle, and this flexion is further increased as the occiput meets the resistance of the pelvic floor. This attitude of the head, moderate flexion in the oblique diameter, was first described by Solayres, and is called **Solayres obliquity**. The movement of flexion in multiparae occurs at the end of the first or the beginning of the second stage. In the primipara it occurs before labor or during the first stage.

Descent of the head is due to the general intra-uterine pressure, and the straightening of the fetal body. Gravity plays but a small part. The fundus prevents the breech from approaching the diaphragm during a contraction, and establishes a fixed point. The fetal curve is diminished during a pain, and the head must of necessity yield to pressure, and consequently descends into the pelvis.

During descent, the head meets with resistance at the pelvic floor. The greatest resistance of the pelvic floor is found in the posterior segment. The levator ani

muscle, with the other muscles and tissues of the pelvic floor, enter into the formation of a scoop-like body with its greatest resistance behind a line joining the spines of the ischii, the tendency and function of which, by resistance and contraction, are to guide and direct whatever comes in contact with it, anteriorly, toward and into the vulvar slit, the weakest and least resistant portion of the pelvic diaphragm.

When the occiput lies under the pubis it is held firmly by the spincter-like action of the levator ani muscle. Anterior rotation occurs in multiparae at the close of the second stage, but in primiparae it may occur in either the first or second stage.

When the occiput is firmly anchored under the pubis. extension follows. The chin leaves the chest, the occiput rises, and the head, face and maxilla sweep successively over the perineum.

External restitution is the last movement in the mechanism. It is due to the passing of the shoulders through the pelvis. The bisacromial diameter passes through the inlet in the opposite oblique to that traversed by the head. It undergoes the same mechanism as the head, and as the latter untwists itself, the occiput again occupies the same lateral position it held before engagement. External restitution may be absent or anomalous in certain cases.

Mechanism of Labor in the Flat Pelvis

The mechanism of labor in the flat pelvis is characterized by three chief features: (1) Transverse position of the head. (2) Deflexion. (3) Asynclitism. The constancy with which these movements occur depends upon the degree of deformity. The greater the flattening, the more certain the mechanism.

If the head presents above the flattened inlet in an oblique diameter, the resistance encountered at the promontory and pubis causes its rotation so that the sagittal suture coincides with the transverse of the brim. This transverse position is a constant phenomenon in all cases where the deformity is appreciable. The position is retained until the inlet is passed and the forehead meets with resistance on the pelvic floor.

A deflexion of the fetal head known as **Michaelis' obliquity** is necessary because it is impossible for the

biparietal diameter (9.5 Cm.) to engage in the shortened conjugata vera. The widest transverse measurement of the head is opposed to the true conjugate when the head is well flexed.

When the anterior fontanelle descends, in deflexion of the head, the bitemporal diameter (8 Cm.) is substituted for the biparietal of 9½ Cm., and a gain of 1½ Cm. is thus effected. The wider portion of the head is enabled to pass into the inlet by utilizing the space at the side of the projecting promontory. The head is more compressible in the region of the bitemporal diameter because of the coronary sutures on either side. This extended position is maintained while the head is overcoming the obstruction at the inlet. As the pelvic floor is reached, the head flexes preparatory to undergoing internal anterior rotation.

When the parietal bones present equally above the inlet, the head is said to sustain a **synclitic** relation to the pelvis. **The loss of this relation is characteristic of the mechanism.** Because of the difficulty of engagement and the high position of the presenting part in deformed pelves, the anterior abdominal wall is subjected to increased pressure and often becomes pendulous. The uterine axis changes, and during labor the intrauterine pressure acts more obliquely than normal, and more efficiently on the anterior half of the inlet. The high and sharp promontory obstructs the descent of the posterior parietal bone and the anterior parietal slowly sinks downward behind the symphysis. The head thus rotates on its occipito-frontal axis and approaches the posterior shoulder.

An internal examination at this time reveals the following findings: Both the anterior and the posterior fontanelles lie posterior to the transverse diameter of the pelvis. The anterior fontanelle is easily palpable, because of the prior descent of the sinciput in the deflexion of the head. The larger portion of the inlet is covered by the anterior parietal bone, which bulges considerably. The posterior parietal bone is flattened from pressure by the promontory. The posterior parietal is usually forced under the edge of the anterior parietal, and both parietals overlap the occipital bone. When the contraction is marked, the sutures and fontanelles are obliterated. This condition is known as **Naegeli's obliquity, or an anterior parietal presentation.** The head is said to be **asynclitic**, and the

condition is also known as **anterior asynclitism**. If the lateral flexion of the posterior shoulder is extreme, the sagittal suture may be palpated above the level of the promontory, and the anterior ear may be felt below the pubis.

When the anterior parietal becomes arrested below the pubis, the intrauterine pressure is exerted upon the obstruction at the promontory. If the powers of labor are strong, and this is generally the case in rachitic women, the posterior parietal bone yields under pressure and is slowly forced into the pelvis. In moderate deformity, the indentations in the bone are rectified spontaneously before the head is delivered. In more severe cases, spoon-shaped depressions are common and may be complicated by fracture of the vault and cerebral hemorrhage. As the posterior parietal sinks into the pelvis, the sagittal suture approaches the transverse diameter of the cavity, and when these coincide, the normal synclitism is restored and the head is engaged.

This asynclitic position of the head is the effort on the part of Nature to effect engagement, and is the most satisfactory method physically of utilizing the diminished area at the inlet. The greatest resistance is offered at the inlet, and hours and days may be spent in labor before the obstruction is overcome. If the patient's strength is ample, the labor usually terminates spontaneously. In as much as the cavity and outlet of a rachitic pelvis are large, the fetus is delivered in a short time after engagement is completed. The powers of labor now act upon the occiput, which descends to the pelvic floor, thus flexing the head preparatory to anterior rotation. When the occiput lies anterior, the head is expelled in the usual manner.

In approximately 10 per cent of flat pelves, the head presents in **Litzmann's obliquity, or posterior parietal presentation**. In this position the posterior parietal bone covers the greater part of the inlet, and the head is bent toward the anterior shoulder. This is called **posterior asynclitism**. The axis of the fetal neck is placed at nearly a right angle to the long axis of the trunk. This angle may be palpated externally.

On internal examination, the sagittal suture and both fontanelles are found anterior to the transverse diameter of the pelvis. The coronary suture lies near the promontory. In marked deformity, the posterior ear

presents. Contrary to the conditions in Naegeli's obliquity, the sagittal border of the anterior parietal is overlapped by the posterior parietal and this finding is characteristic of the condition.

Litzmann's obliquity may occur in the normal pelvis, (½ per cent) and in those slightly flattened. Engagement in this type of pelves is spontaneous, but in pelves of greater deformity, the condition is very unfavorable. This is due to the angle between the neck and the trunk, whereby the powers of labor tend to increase the obliquity rather than to depress the anterior parietal bone. Owing to the construction of the pelvis, it is physically more difficult for the head to pass than in Naegeli's obliquity. The anterior position of the lumbar and sacral vertebrae may offer definite resistance to the descent of the posterior parietal bone. The long time necessary to complete the mechanism spontaneously is often fraught with danger to both mother and child.

Justo-Minor Pelvis

Characteristics—The generally contracted or justo-minor pelvis possesses in general the form and contour of a miniature pelvis. Its diameters are diminished from one to three centimeters. When greater contraction is present the possibility of rachitis should be suspected. The pelvis is similar to that of a young girl, possessing many infantile features and suggesting the probability of an arrest of development at the time of puberty.

While persons of large frame may possess the generally contracted pelvis, the great majority occur in those of slight stature and defective nourishment.

The sacrum is small and its wings are shorter than the bodies. The vertical curve of its anterior surface is lessened, while the transverse bend is increased. It is but slightly inclined into the pelvic inlet. The promontory is high. The entire ilio-pectineal line is palpable. The form of the inlet is oval or circular, and presents an equalized pressure to the descent of the head. The diameters of the cavity and of the outlet are small, but the contraction is only moderate.

Mechanism of labor in Generally Contracted, or Justo Minor Pelvis—The fetal head meets with a rather uniform resistance at the pelvic brim, and becomes so well flexed

that the posterior fontanelle is found in or very near the axis of the birth canal. This attitude of the head, extreme flexion, is called **Roederer's obliquity,** and is characteristic of the mechanism. It will be seen that in extreme flexion the suboccipito-bregmatic diameter (9½ Cm.) is substituted for the less favorable occipito-frontal diameter (12 Cm.). The degree of flexion is commensurate with the degree of contraction. As the contraction is generally uniform from the inlet to the outlet, the head is maintained in forced flexion until it is finally delivered. If no flattening is present, the head attempts to enter the inlet in an oblique diameter. Rarely, the true conjugate is occupied by the sagittal suture. The Naegeli and Litzmann obliquities are the rare exception in a pure type of general contraction. They are more common when flattening complicates the deformity.

Labors in the justo-minor pelves are tedious and difficult, providing the fetus is alive and fully developed. The uterine contractions are weak because of delayed pressure on the lower uterine segment, and the often imperfect condition of the uterus itself (infantile uterus). The head is moulded to an extreme degree (dolichocephalus), and in some cases a secondary moulding is necessary before delivery takes place. If deflexion occurs while the head is in the pelvic cavity, the labor is arrested and dangerous symptoms will arise unless Roederer's obliquity is restored. Prolapse of the cord is rare because the entire inlet is occupied by the presenting part. Premature rupture of the membranes is also rare, on account of the even pressure exerted by the presenting part upon them.

The fetal mortality is higher than in the flat pelvis, because of the greater need of operative interference. Breech extractions are especially dangerous and difficult.

Diagnosis—A diminution of the external measurements, in which all measurements are from 1½ to 2½ Cm. shorter than normal, is very suggestive. A measurement of 20 Cm, or less in the obliques is usually considered evidence of the presence of this type of pelvis. A circumference of 70 Cm. or less is always an evidence of the condition provided other types of small pelves have been ruled out.

The ability to palpate the entire rim of the pelvic inlet, the detection of a normal or decreased pubic

angle, and a true conjugate shortened from 1 to 2 Cm. is very suggestive.

The mechanism of labor is of great assistance in the diagnosis of the exact condition. A discovery of the posterior fontanelle deep in the pelvis and lying in its axis, with marked moulding and a large caput succedanum, after a tedious labor, is diagnostic. In the infantile form, the associated mal-development of the genitalia and breasts is to be remembered. In multiparae, the former labors were tedious, often operative, and dead babies were common.

Flat Generally Contracted Pelvis

(Rachitic and Non-Rachitic)

This pelvis is a combination of the two important deformities, flattening and general contraction.

Characteristics—The various pelvic diameters are small, but the transverse is still the longest of the inlet. The capacity of the inlet is diminished. The usual cause of the deformity which prevents a normal development of the bones and causes the promontory to sink into the inlet is rachitis, but the non-rachitic type is occasionally observed.

Mechanism—The mechanism depends upon he preponderance of one deformity over the other. Pendulous abdomen and malpresentations of the fetus are common complications. In cephalic presentations, if the flattening is slight, the head lies in marked flexion. If the flattening is greater, the head lies transversely and Naegeli's obliquity is common. In border line cases, the head may lie transversely, but deeply flexed. Marked dystochia is common.

Diagnosis—The pelvis presents marked shortening in all diameters, with especial contraction of the antero- posterior diameters. The rachitic type is diagnosed as in other types of pelves, by the relation between the interspinous and intercristal diameters.

A study of the above types of pelvic deformity is of great assistance to the obstetrician. They are met with in every day practice. As each type of deformity requires a special mechanism, it is necessary that such mechanism take place. A mechanism which is normal in a normal pelvis, is abnormal in a flat pelvis, and a mechanism normal in a flat pelvis is impossible in a generally contracted pelvis. Necessary factors in

originating and maintaining the proper mechanism are strong uterine contractions. Weak uterine contractions frequently disturb the mechanism. Antepartum examinations, made before the fetus has grown so large as to interfere with his investigations, are necessary to enlighten the physician as to the shape and size of the pelvis. After a difficult, and especially after an operative delivery, a complete examination of the inlet, cavity and outlet of the pelvis, should always be made.

Justo-Major Pelvis (Generally Enlarged Pelvis)

In this pelvis all of the measurements are far in excess of those in the normal standard pelvis, although the relationship existing between the various measurements is normal.

Frequency—This type of pelvis is relatively common, being found usually in women of extremely large stature, but occasionally in medium sized women.

Diagnosis—(1) Large stature of woman (generally), (2) Increased external diameters, especially the external conjugate. (3) Inability to palpate the sacral promontory or the lateral pelvic walls. The outlet is usually normal.

Dangers—Prolapse of the cord, precipitate labors with postpartum hemorrhage, and lacerations of the soft parts.

Mechanism—Variable. No special type is maintained in labor. The soft parts may offer the only material resistance to the presenting part. Deflexion of the head and Naegeli's obliquity may occur at the inlet without increasing the difficulty of labor.

Funnel-Shaped Pelvis

This type of pelvis is contracted at the outlet, either in the transverse or in both its transverse and antero-posterior diameters.

Etiology—The cause of the deformity is not known. It is very frequently found associated with a lumbar kyphosis, but may be due to faulty development not associated with abnormalities of the spinal column. It is also frequently associated with a condition characterized by a bony union or assimilation, between the last lumbar and first sacral vertebra, the sacrum thus containing six instead of five vertebrae.

Characteristics—The inlet may resemble the normal pelvis, or may be characteristic of either the flat or generally contracted pelves, simple or rachitic.

The lateral walls converge, so that the outlet of the pelvis is diminished in size. The pubic arch is narrow.

The depth of the pelvis is greater than normal, on account of the increased length of the sacrum, greater depth of the lateral walls and greater height of the symphysis.

Diagnosis—The diagnosis of this condition can only be made by accurate pelvimetry of the pelvic outlet. If either the transverse, normally 11 Cm., is reduced to 8 Cm. or less, or the antero-posterior, normally 11 Cm., is reduced to 9 Cm. or less, a diagnosis is positive.

The Prognosis of Labor—Depends not so much upon the exact length of either the transverse diameter of the outlet or the antero-posterior diameter of the outlet, as upon the available space between the tuberosities of the ischii and the coccyx. This is measured as a diameter, between the center of the transverse diameter of the outlet, and the tip of the sacrum. It is called the posterior sagittal diameter of the outlet. Thus in order that spontaneous labor may occur in funnel pelves, the posterior sagittal must be increased in length in proportion as the transverse is lessened and the pubic arch narrowed.

If the transverse diameter measures 8 Cm., the posterior sagittal should measure at least 7½ Cm. The shorter the transverse becomes, the longer the posterior sagittal.

The dangers to the mother result from extensive lacerations, long pressure of head upon soft parts, with sloughs and fistulae. A large proportion of the children are lost, as a result of operative procedure undertaken late in labor, frequently without a knowledge of the exact condition causing the dystochia.

Course of Labor—Labor begins as in a normal case, but as the head reaches the outlet there is an arrest of its advance. In moderate contraction, the powers of labor may be sufficient to overcome the obstruction, but if the deformity is marked there is a complete arrest until operative procedures are undertaken. Extensive lacerations are common.

Obliquely Contracted Pelvis (Pelvis of Naegeli)

Etiology—The shape of the obliquely contracted pelvis depends upon the imperfect development or absence of the ala of the sacral vertebrae on one side. The deformity may be acquired in those who have lost a limb or where an extremity has been diseased, as in tuberculosis of the hip joint. In these cases the entire weight of the body is thrown on the healthy leg, and this increased pressure straightens the antero-lateral pelvic wall.

In a majority of cases, however, the pelvis is a result of a developmental defect, there being an absence of the bony nuclei in the ala on one side of the sacrum.

Characteristics—There is a lack of development, or a maldevelopment, of one of the sacral wings, and a synostosis or ankylosis of the corresponding sacro-iliac synchondrosis. On the affected side, the iiium is higher and straighter than normal, and slopes but little. The sacro-sciatic notch is small, and the ischial tuberosity approaches the coccyx.

The antero-lateral pelvic wall is straightened, and this is compensated for by a marked angle posteriorly. The acetabulum lies more on the anterior pelvic wall. The symphysis pubis is forced over toward the healthy side.

The unaffected side is practically normal.

Internal examination shows that the true conjugate is normal or longer than normal, but the ilio-pectineal line on the affected side is pushed into the cavity of the pelvis and is palpable throughout its entire extent. The pubic arch is irregularly contracted. The transverse diameter of the inlet is shortened, and one oblique is always less than the other.

Diagnosis—The diagnosis is not difficult if routine pelvimetry is done. Five measurements which are equal in the normal, but differ in the obliquely contracted pelvis, are as follows:

1. External oblique diameters, from the anterior superior spine of one side to the posterior superior spine of the opposite side, right and left.
2. The distance from the tuber ischii of one side to the posterior superior iliac spine of the opposite side, right and left.
3. The distance between the spinous process of the last lumbar vertebrae and the anterior superior iliac spine on either side.
4. The distance between the great trochanter of one side and the posterior superior iliac spine of the opposite side, right and left.
5. The distance between the lower border of the os pubis and the posterior superior iliac spine of either side.

A difference of more than 1 or 1½ Cm. in these measurements indicates a Naegeli pelvis.

Internally, one palpates the straightened antero-lateral wall of the inlet on the affected side, and this straightening may be followed down to the outlet. The pubic arch may be narrow,

A routine vaginal examination during pregnancy will usually lead to the diagnosis, even without pelvimetry. The obliques should be taken as routine, however, and this is especially indicated in any woman giving a history of any interference with locomotion.

Frequency—This type of pelvis is relatively frequent, but is often overlooked until a serious dystochia calls attention to the deformity.

Influence upon labor—If the deformity is only moderate, spontaneous delivery may occur after a tedious labor. The mechanism is frequently similar to that observed in a generally contracted pelvis, since the only portion of the pelvis available for delivery is the non-deformed side, and through this sound side, the head must pass. If the head is small, the pains strong, and flexion extreme, delivery may be possible. In a great majority of cases, however, Cesarian section offers the only hope of obtaining a good obstetrical result.

Double Obliquely Contracted Pelvis.

(Pelvis of Roberts)

Characteristics—This is practically a double Naegeli pelvis, with maldevelopment or non-development of both sacral wings, instead of one single wing, as in a Naegeli pelvis. The anterior sacral foramina are small and narrow. The sacrum is quadrangular in shape, and is forced anteriorly between the iliac bones. The transverse curve is destroyed, while the vertical curve is diminished or absent. The iliac bones are straight, and the pubic rami meet in the median line at an acute angle. The pelvic inlet is rectangular or wedge shaped, having its base posteriorly.

The contraction increases towards the outlet, which is very narrow transversely.

Diagnosis—The diagnosis is made from the shortened interspinous, intercristal, and bitrochanteric diameters. The external conjugate is normal. Internal examination reveals an extremely acute angle at the symphysis, and straight lateral walls. The extreme transverse contraction of the outlet is significant. The proximity of the spines to the coccyx is also apparent.

There is no mechanism of labor in this type of pelvis, and all cases are to be treated by Cesarian section.

Osteomalacic Pelvis (Malacosteon Pelvis)

This Pelvis gives us the most extreme types of deformity.

Etiology—This pelvis is the result of osteomalacia, a disease of adult life. The pelvis is very rarely seen in America. Osteomalacia is characterized by a decalcification of the bones, particularly of the pelvis and vertebrae. It usually begins during pregnancy, ceases to progress when lactation stops, and begins anew during the following gestation. Since the bones are decalcified and hence softened, the form of the pelvis will depend upon the pressure exerted upon the sacrum and acetabula, combined with muscular action

Characteristics—The lumbar vertebrae are bent forward and downward to an extreme degree, so that they partly roof over the inlet. The sacral wings are small, and the bodies are displaced far anteriorly. The vertical curve of the sacrum is markedly increased. The upper bodies may lie horizontally, while the coccyx is pulled forward, and at times upward to such a degree that it almost meets the promontory. The lateral pelvic walls are bent inward, and the acetabula approximated. The horizontal pubic rami are pressed together so that they are separated by a narrow cleft.

In the mild cases the pelvic inlet is triangular in outline, but when the disease is more advanced, it has a tri-radiate or Y-shaped appearance, and is absolutely unfitted for obstetrical purposes. The greatest contraction occurs at the outlet, where the coccyx and tuber ischia may lie in close proximity to one another.

Mechanism of Labor—This depends upon the degree of elasticity of the bones. If the pelvis is rigid and unyielding, and the child is fully matured, labor is impossible except in mild degrees of deformity. If the bones are soft and yielding, and the uterine contractions strong, the fetus may force its way through the pelvis by springing the bones back into place, and be born spontaneously. There is no characteristic mechanism.

Diagnosis—A history of pains in the pelvis and sacrum, similar to rheumatism; muscular tremor or paralysis; increasing difficulty of delivery with each succeeding labor, will call attention to a possibility of osteomalacia. The patient notices that her spine, ribs and pelvis are sensitive to pressure. She notices that there is increasing difficulty in locomotion.

Locally, the narrow cleft between the pubic rami and the proximity of the promontory (excluding Roberts Pelvis), the transverse shortening of the outlet, and the bend in the sacrum, are the diagnostic features.

Treatment—The patient should be put under deep anaesthesia and the hand inserted into the pelvis. If the bones are soft and yielding, the case may be treated expectantly, provided the pains are strong. If the bones are rigid and unyielding, Cesarian section is to be preferred. Cesarian should be followed by double oorphorectomy, since it has been noted clinically that this measure will cause an arrest in the disease.

SPONDYLOLISTHETIC PELVIS

Characteristics—The name means "the slipping of the vertebrae." There is a dislocation forward of the last lumbar vertebra, so the vertebra either projects beyond the anterior surface of the sacrum, or in more marked cases the inferior surface of this last lumbar vertebra lies entirely upon the anterior upper surface of the sacrum. As a result of this there is a marked lumbar lordosis, so that the fourth, the third and possibly the second lumbar vertebrae have rolled into the brim of the pelvis. This results in changes in the stature of the woman, with shortening of the true conjugate. The promontory is usually rotated backwards on its transverse axis, and the outlet is subsequently diminished.

Diagnosis—Inspection shows a marked lumbar lordosis, the entire trunk seeming to have caved in, so that the ribs almost come in contact with the iliac crests.

Internal examination shows that the last lumbar vertebra (and perhaps third and fourth) is lying in front of the anterior and upper portion of the sacrum. The bifurcation of the aorta, or the common iliac arteries, are frequently accessible.

Effect upon Labor—In the low grade cases, this deformity has the same influence as has been noted in the flat pelvis. Marked cases will require a Cesarian section.

ASSIMILATION PELVIS

There are two types of this pelvis, the **high assimilation**, in which there is a bony union between the last lumbar and first sacral vertebrae, and the **low assimilation**, characterized by a cartilaginous union between the first and second sacral vertebrae.

In the high assimilation pelvis, the depth is greatly increased, and the high position of the promontory may interfere with engagement. Outlet usually contracted.

In the low type, a pelvis results which is very shallow in its posterior portion and usually offers no obstacle to delivery.

KYPHOTIC PELVIS

Etiology—Results from tubercular caries of the spine, and rarely from rachitis. If the kyphosis involves only the dorsal vertebrae, the pelvis is little affected, but if it is in the dorso-lumbar region, a distinct type of pelvis is produced.

Characteristics—There is a compensating lordosis of the lumbar spine, forcing the promontory of the sacrum backward and its tip forward, thus rotating it upon its transverse axis. At the same time the lateral walls of the pelvis converge and the ilia flare outward, enlarging the false pelvis, although there is a moderate contraction at the brim. Owing to the tilting backward of the sacrum the true conjugate is lengthened, but the outlet is decreased.

The result of these changes is a pelvis with plenty of room at the brim, but with its capacity diminishing in the excavation and becoming narrowest at the outlet, i. e., a funnel-shaped pelvis.

Effect upon Labor—In certain rare cases the compensatory lordosis is so extreme as to block the pelvic inlet, causing a so-called **pelvis obtecta.** In marked cases a Cesarian may be necessary, but in the vast majority of cases watchful expectancy will be followed by spontaneous delivery. Judge each case on its own merits. Be careful not to overlook an absolute contraction of the outlet.

Associated Pelves—Scoliosis, existing alone or in combination with kyphosis, may produce distinct changes in the pelvis. As in kyphosis, scoliosis must be in the dorso-lumbar region in order to affect the pelvic measurements. Scoliosis results in an oblique deformity of the pelvis, due to the rotation of the sacrum.

TREATMENT IN DEFORMED PELVES

Labor in deformed pelves is often prolonged and tedious, and requires the constant attention and exercise of mature obstetric judgment on the part of the obstetrician. Frequently the operations necessary to terminate delivery require his highest surgical ability.

An **antepartum examination,** including heart, lungs, kidneys, and a determination of pelvic capacity, enables him to refrain from internal examinations during labor, and thus preserves the conditions that are necessary for certain primary operations. A knowledge of

the degree and type of deformity will forewarn him of certain complications during labor, and an early detection of these accidents is of great value in the treatment.

The **character of uterine contractions** is also of extreme importance. A strong vis a tergo can drive a head through a deformed pelvis spontaneously, while weak pains may fail to expel the child even through a pelvis of larger dimensions. When the powers of labor weaken, complications are imminent. In rachitic women the uterine contractions are usually strong and powerful, and many labors in the rachitic pelves are spontaneous. In the justo-minor type, the pains are weaker, the labor is more prolonged, and artificial assistance is often necessary.

The **fetus** itself is another factor. Premature children possess softer and more easily moulded heads, and may pass through a pelvis that would not allow the passage of a mature child. As the labor is still difficult at this time, and as their natural resistance is subnormal from prematurity, many of these children die. If the head is large and hard, dystochia may be encountered even in the normal pelvis. The contracted pelvis would necessarily offer greater resistance. If possible, the relative size of the fetal head should be determined previous to labor. If **Perret's Cephalometer** is used, the occipito-frontal diameter is measured through the abdominal walls. The biparietal diameter is obtained from this by subtracting 2½ Cm. **Mueller's method** has proven more valuable in my hands. Under anaesthesia, the occiput and brow are grasped externally with the fingers and forced directly into the inlet. If the head descends readily, as can be ascertained by an internal examination, a spontaneous delivery may be expected. If the head will not enter, the probability of a spontaneous labor will depend upon the powers of labor, and the probable extent of cephalic moulding.

Having obtained a knowledge of the form, size and peculiarities of the pelvis, and the position, size and consistency of the fetal head, the attendant can make a fairly accurate prognosis provided the uterine contractions are strong. The pelvis is practically constant in every labor. The child increases in size until the mother reaches 35 years of age, and then decreases. It also varies with the duration of each individual pregnancy. The powers vary to a marked degree, not only

in different labors, but in a single labor itself. This is the unknown, and therefore one of the most important factors of labor.

Symmetrical Deformities

Symmetrically deformed pelves (except the funnel-shaped type, and the double obliquely contracted pelvis), are divided into three grades. These grades comprise **absolute contraction,** in which the C. V. measures less than 5½ Cm. in the flat pelvis, or less than 6 Cm. in the generally contracted; **relative contraction,** with C. V. of 5½ to 8 Cm. in the flat, or 6 to 8½ in the generally contracted. (Note: In defining the degree of contraction for generally contracted pelves, ½ Cm. should be added to the true conjugate to correspond with the same measurement in the flat pelvis. This is necessary on account of the shortened transverse of the brim in the generally contracted type.)

Absolute Contraction

In this grade it is impossible to extract a living or dead child at full term, through the pelvis. Delivery of the crushed head is only possible when fetus is small, the maximum limit of contraction exists, and is then effected at the expense of serious maternal laceration. The extraction is difficult and often impossible, and is never to be recommended.

If the contraction is seen during early pregnancy, and patient refuses to submit to a laparotomy at term, the artificial induction of abortion is indicated. The maternal mortality in selected cases is practically zero. Abortion or premature labor are not to be performed after the twenty-eighth week, since a laparotomy will be required to terminate the labor, and the child will be sacrificed.

If seen early and the mother is desirous of saving her offspring, the primary Cesarian is selected and carried out at the beginning of labor or soon after. The mother should be in a well equipped hospital, and no internal examinations should be made for several days preceeding the delivery.

If the patient is seen later, if infection is present or the fetus dead, abdominal delivery is still required, since it is impossible to do a craniotomy if the pelvis is absolutely contracted. For these cases the extra-

peritoneal Cesarian section gives fair results in competent hands. Equally good results are usually obtained if the Sanger operation is done, and the uterus is removed. (On account of infection.) The maternal mortality is high.

Synopsis—Cesarian section always, with removal if uterus is infected. (Abortion permissible before the twenty-eighth week, if patient is seen early and an operation at term refused.)

Relative Contraction

If patient is seen during pregnancy premature labor may be elected. This operation has a field of from 7 to 8 Cm. The elective time is between the thirty-fourth and thirty-fifth week, but this should be guarded by Mueller's Method, as the size of the fetal head is of equal importance as compared with that of the pelvis. Since many cases of pelvic contraction between these limits terminate spontaneously, or by means of forceps, I regard the induction of premature labor as a method of the past in the treatment of pelvic contraction. An induced labor is an abnormal labor, and not only opens the way to sepsis and operative intervention, but is actually fraught with as much danger as operative procedures in skilled hands. The mortality to the child is over 20 per cent, since the premature child bears trauma badly. The mortality to the mother is hardly beter than that following a properly performed section.

These cases should be allowed to go into active labor before operative interference is indicated. If the head, upon external and rectal examination, is found to be engaged after a few hours of active labor, the course should be that of watchful expectancy, with rigid asepsis, no vaginal examinations and special attention to the preservation of conditions for operative interference.

As a rule, a full sized child cannot be gotten through the pelvis alive, except in the upper limits of relative contraction. If at the end of a few hours the head is not engaged, a choice is to be made between Cesarian section, Pubiotomy (contraindicated if C. V. is below 7½ Cm.), and Craniotomy.

Cesarian section is indicated if the case is a clean one, vaginal examination restricted, membranes un-

ruptured or very recently ruptured, and hospital facilities are available, providing the fetus is alive and in good condition.

Pubiotomy is performed solely in the interests of the child, in a case in which the head is wedged in the pelvis so that a little increase in pelvic diameters is all that is necessary in order to permit delivery; if the child is living and viable; if the condition of the mother, as to asepsis and resistance, contra-indicates a Cesarian; if the cervix is completely dilated and effaced; and if a careful trial with the forceps, by a good operator, has failed. This is a very dangerous and difficult operation.

Craniotomy is indicated if the child is dead or dying; if the case is infected; or if facilities for Cesarian or Pubiotomy are lacking.

Synopsis—When the child is alive and viable, clean case, do induction of labor or Cesarian. (Short test of labor.) If the child is dead or non-viable, or case infected, do a craniotomy.

Moderate Contraction

These are the so-called borderline cases and in my opinion require the most careful judgment in order to obtain good results.

In primiparae a thorough test of labor is always advisable. By a test of labor we mean that after having ascertained, by careful examination, the size of the pelvis, and estimated the size and consistency of the fetal head, and determined its position and attitude, the woman is allowed to continue in labor until the cervix is completely dilated. During this period watchful expectancy is our watchword. Mother's temperature and pulse is taken at least every two hours, in order that we do not overlook the most important sign of maternal exhaustion, i. e., a rising pulse and slight elevation of temperature. The fetal heart is taken every hour during the first stage, since our only pathagnomonic sign of fetal asphyxia is an irregular fetal heart, or one that is increased or decreased in rate.

Rigid asepsis is essential during this test of labor, since we cannot be sure that the necessity of a major obstetric operation may not arise, and in the presence of infection the danger to mother and child is overwhelmingly increased. Rectal examinations only.

The abdomen must be carefully watched for signs of threatened rupture of the uterus, as evidenced by tenderness of the lower uterine segment.

Preservation of the membranes is important, since it is known that the danger of infection varies directly with the length of time elapsing between rupture of the membranes and delivery. (Other factors being equal.) This may be accomplished best by forbidding any straining or bearing-down efforts during the first stage, by allowing no vaginal examinations, on account of trauma, and by encouraging the patient to remain in bed, in the lateral position, during the first stage. She should lie on the side toward which the occiput is directed.

If this period of dilatation is prolonged, it may be necessary to give the patient periods of rest, in order that she may recuperate from the strain of labor. This may be done by the administration of morphine, in ¼-grain doses, by hypo. It may require ½ grain to accomplish the desired result.

In the second stage, after rupture of the membranes, the patient should be instructed to bear down with her pains. We now listen to the fetal heart every fifteen minutes, since it is in this period that the fetus suffers most from interference with the fetal circulation due to pressure. Engagement may be facilitated by the use of Walcher's position. If the head enters the pelvis after the membranes rupture, and an indication to terminate the labor arises, delivery can be effected by forceps.

If the head lies in the inlet, but is not engaged during the second stage, we must choose between high forceps, hebosteotomy, and Cesarian section, or rarely, a version.

High forceps will give from 4% to 10% maternal mortality, and 40% to 80% fetal mortality. The operation is difficult and gives bad results. If the head is in the inlet, well moulded, and the non-advance is not due to disproportion, it may be the operation of choice. Again, in an infected case caesarian or pubiotomy would be contraindicated and high forceps might have to be done. Karl Braun recommended that not over 8 to 10 tractions be used in what he called the operation of diagnosis. If after this there is no advance, other means of delivery must be chosen in order to save the child, and its mother. If unsuccessful and the child

is in good condition, pubiotomy or possibly extra-peritoneal caesarian section may be thought of. If the child is dead or dying, craniotomy is our choice.

Hebosteotomy competes with extra-peritoneal caesarian in cases which although not infected, have had a long test of labor; or have been interfered with, as in a forceps; or membranes have been ruptured for several hours. A true conjugate of over 7½ Cm. is necessary, and complete dilatation and effacement are prerequisites. Bad results have followed pubiotomy, and the operation is not held in good repute by the leading obstetricians.

Cesarian section still offers the best chance for mother and baby, in a clean case, with hospital facilities, providing the head is well above the inlet and the degree of contraction is at all marked.

Version is never to be undertaken in a generally contracted pelvis. On account of its difficulty, in a primipara it will rarely give good results. It has little or no place in the type of cases under consideration.

In multiparae. The history of former labors is of value, and may determine the mode of treatment. If the head has passed the inlet, the labor will probably terminate spontaneously. If delivery is indicated because of fetal or maternal conditions, forceps are to be used. If the head lies above the inlet, in a flat pelvis, version will give fair results. With a history of serious dystochia in previous labors, and particularly if still-births have resulted, Cesarian is to be thought of. The seriousness of even slight contraction (9 to 10 Cm.), in certain pelves, is not to be overlooked. I have seen extremely serious dystochia result. This is especially likely when the fetus is overdeveloped, but it is difficult to be certain on this point.

Synopsis—Primiparae, watchful expectancy with test of labor, interfering only upon specific indication, usually maternal exhaustion or fetal asphyxia. Three hours in second stage, without advance, is legitimate indication. Forceps, hebosteotomy, Cesarian or rarely version may be indicated.

Multiparae, watchful expectancy, or possible selection of primary Cesarian on account of bad obstetrical history, involving two or more labors. If test of labor is selected, forceps, version, pubiotomy may be required.

Funnel Shaped Pelvis

Discussion—In order that spontaneous delivery be possible, the following relationships between the transverse diameter of the outlet, and the posterior sagittal diameter, must exist:

Transverse diameter of 8 CM. requires posterior sagittal of 7½ Cm.

Transverse diameter of 7 Cm. requires posterior sagittal of 8 Cm.

Transverse diameter of 6½ Cm. requires posterior sagittal of 8½ Cm.

Primary Cesarian may be required if these relations are not present, or if there are complicating factors. In primiparae it is best to wait for spontaneous delivery if transverse is greater than 7 Cm. Where interference is required, a careful trial with forceps, and if necessary, pubiotomy, give best results.

In multiparae with history of dead child and transverse of less than 8 Cm., Cesarian.

Asymmetrical Deformities

Treatment in Asymmetrical Pelves, and in Roberts Pelvis—The method of delivery must depend upon the kind and degree of the obstruction, and the condition of the patient.

CHAPTER 10

Anomalies of the Passenger

OVERGROWTH OF THE FETUS

Factors Influencing—An occasional cause of dystochia results from overdevelopment of the fetus. It is well to note some of the important influences affecting overgrowth.

Multiparity—There is a tendency for each succeeding child up to the fourth or fifth to be a little larger than the preceding child. Thus a history of a spontaneous delivery in a small pelvis does not always indicate that a relative disproportion may not result in later labors.

Prolongation of Pregnancy—While it is true that authentic cases of prolonged pregnancy, even exceeding 300 days, have been reported, it is equally true that these cases are extremely rare.

Missed Labor—In this condition slight labor pains begin at term, but soon cease. The child dies, but may be carried in the uterus for months or even years. The child may be overdeveloped if death does not take place at full term.

Oversize of Parents—The possibility of a dystochia resulting from the union of a small wife with a large husband should be borne in mind.

Treatment—In labor the treatment will, of course, depend upon conditions present. In consideration of the induction of labor in cases "past full time" a word of warning may not be amiss. In a normal pelvis there is no indication for induction of labor for prolongation of pregnancy. The value of the menstrual history in determination of the probable date of confinement is very slight. Mensuration of the fetus in utero for the purpose of determining date of confinement is difficult, and not accurate.

If the pelvis is small, the woman should not be allowed to go more than two weeks beyond her expected date, without making frequent, careful comparison of the size of the fetus with that of the pelvis. If a relative disproportion is apparent, the induction of labor might at this time be considered.

MALFORMATIONS OF THE FETUS

Hydrocephalus

This is a relatively common malformation, of unknown etiology, and characterized by a distention of the cerebral ventricles with fluid, and consequently an enlargement of the head. The cranial bones are imperfectly developed and are thin and pliable. The sutures are extremely wide and the fontanelles large. The brain substance, as a result of this pressure, is very scant in amount.

Influence Upon Labor—Spontaneous delivery may occur only when the head is not too large or tense. In cephalic presentations obstruction occurs at the brim, and rupture of the uterus may occur from non-recognition of the obstruction, or from the great distention of the lower uterine segment by the enormously distended head. In breech presentations the impossibility in extracting the aftercoming head usually calls attention to the condition.

Diagnosis—External examination in a vertex presentation shows an extremely enlarged head well above the

brim. To the examining fingers this gives a crackling sensation, and occasionally fluctuation.

Internal examination reveals the presenting part high up and difficult to reach. If the hand is introduced into the vagina the examiner can palpate the wide sutures and fontanelles, with thin, pliable cranial bones.

The history of labor is important in leading to an accurate diagnosis.

Treatment—The most important factor is the diagnosis. The life of the child is to be disregarded, since hydrocephalic children soon die, and during their short lives are imbeciles. Craniotomy is to be performed as soon as the diagnosis is made.

Anencephalic Monster

In this condition the entire cranial vault and almost the entire brain are lacking. Dystochia is rare.

Diagnosis—The presentation is usually a face. Protrusion of the eyeballs, sharp edge of bone due to absence of cranial vault, palpation of sella turcica, and soft mass representing cerebral tissue, will help in the diagnosis.

Treatment—If an indication for delivery arises version and extraction will give best results, because the forceps cannot be used on this deformed head, and it is difficult to extract with the cranioclast.

Usually spontaneous delivery will occur.

PERSISTENT OCCIPUT POSTERIOR

Posterior rotation of the occiput is a very undesirable event in labor. In the great majority of labors where the posterior rotation begins, an anterior rotation occurs either early or late. Where this normal mechanism fails, the case becomes more serious.

Etiology—In a persistent posterior occiput we have deflexion of the head, and as a result of this the forehead reaches the pelvic floor earlier than the occiput. Since the most dependent part rotates anteriorly, the occiput is thrown into the hollow of the sacrum. Any anomaly of the factors of normal labor, such as weak pains, or a torn and relaxed pelvic floor, may produce a posterior rotation. Other factors are pendulous abdomen, abnormal pelves, or small, hard fetal head.

Terminations—There are four possible terminations of a posterior occiput. 1. Anterior rotation and subsequent normal labor. This is the usual termination, although it may occur late. 2. Delivery of the occiput posterior. 3. Delivery as a brow or face presentation. This mechanism is due to a further deflexion of the head. The face is more favorable than the brow. 4. Posterior rotation with impaction.

Mechanism—The deflexed head descends with the sagittal suture in one of the obliques, until the forehead impinges upon the perineum. The occiput then rotates posteriorly through an angle of 45 degrees. Further descent takes place and ordinarily the region just anterior to the large fontanelle impinges upon the lower margin of the symphysis. This makes a fixed point of the anterior extremity of the occipito-frontal diameter, and since descent continues, flexion must result. Thus in an attitude of extreme flexion the occiput is forced downwards over the perineum.

As the pressure of the perineum upon the occiput is released, the head extends, the occiput falls downwards toward the anus, and the brow, nose, mouth and chin appear successively beneath the symphysis.

Diagnosis—External examination: 1. Longitudinal presentation. 2. Back posterior, difficult to palpate. 3. Small parts anterior on side opposite back. 4. Head over inlet. 5. Fetal heart has no characteristic position. Internal examination: 1. Head presenting. 2. Sagittal suture in oblique, or antero-posterior. 3. Small fontanelle posterior. 4. Large fontanelle anterior.

Treatment—During labor our attitude should be that of watchful expectancy. **This is important.** A majority of these cases will terminate spontaneously if left to nature, while meddlesome interference will lead to disastrous results. Labor is prolonged to a marked degree, thus rendering necessary especial watchfulness for signs of fetal asphyxia and maternal exhaustion. Since many cases occur in minor abnormalities of the pelvis, a careful examination early in labor should be made in order to be sure that such an anomaly has not been overlooked in the preliminary examination during pregnancy.

Premature rupture of the membranes will result in a prolongation of labor in this type of cases, and if dilatation does not amount to more than two fingers a colpeurynter had best be inserted into the cervix, to hasten dilatation.

In a very great percentage of cases which require operative interference, the indication arises after the head is engaged. In these cases the double application of forceps, known as Scanzoni's maneuver, gives excellent results.

Manual rotation of the occiput anteriorly is theoretically good obstetrics, but practically never succeeds.

If there is an indication for interference, and the head is above the inlet, version may be the operation of choice in a multipara. In a primipara version as a rule gives very poor results and must be avoided if possible. **Hofmeier-Fritsch expression** is a method of pressing the head into the pelvis, thus engaging the head and rendering possible a forceps operation. The operator stands at the side of the well anaesthetized patient, and grasping the head between the thumb and fingers, presses the head into the inlet. The head is maintained in this position while the forceps are applied, when the delivery may be completed.

If the delivery cannot be effected with forceps, the labor is to be terminated by craniotomy.

Synopsis—Watchful expectancy, interfering only upon scientific indication. Double application of forceps gives best results.

BROW PRESENTATION

This is a cephalic presentation midway between a vertex and a face. The head is neither well flexed nor well extended.

Brow presentations are usually transient, nearly always being converted spontaneously into either face or vertex presentations. Persistent brow presentations occur about once in 1500 labors.

Diagnosis—External examination is not satisfactory. Internal examination shows that the brow is in the axis of the birth canal. At the end of the oblique diameter is felt the large fontanelle, and at the other end the orbital ridges, eyes and root of nose.

The brow is distinguished from a face by palpating the fontanelle, which is impossible in a face; by inability to palpate the mouth and chin, which can be done in a face.

The brow is distinguished from a vertex by palpating the orbital ridges and eyes, which cannot be done in a vertex; and by inability to palpate the posterior fontanelle, which can be done in a vertex.

Mechanism—This presentation is an obstetrical impossibility, if the head and the pelvis are normal in size, since the diameter presenting is the largest diameter of the fetal head, the occipito-mental (13½ Cm.) and the largest available diameter of the normal pelvis is the oblique, measuring 12 Cm.

If the head is small and the pelvis large, the head may become so moulded that the occipito-mental diameter

is less than the occipito-frontal. The brow descends as the most dependent portion of the presenting part, and hence rotates anteriorly to the pubic arch. The forehead, orbital ridges and root of the nose appear at the vulva. The superior maxillary bone impinges against the public arch and becomes a fixed point. Flexion then occurs and the sinciput, followed by the occiput, is forced out over the perineum.

Delivery of a brow presentation as such is never to be expected.

Treatment—If the case is seen early, when the head is movable, we should attempt to flex it. If flexion fails, convert it into a face presentation, if the chin is not posterior. If this fails, a podalc version should be done, if the conditions for that operation are present.

If the head is fixed, a careful attempt to deliver with forceps may be made. but if this fails craniotomy is the only resort.

BREECH PRESENTATION

Definition—Presentation of the pelvic pole of the fetus, involving either breech, knee or foot.

Varieties—(1) **Complete,** or double breech, in which fetus retains its normal attitude, with legs and thighs flexed on abdomen, and consequently the feet and buttocks presenting. (2) **Frank,** or single breech, in which thighs only are flexed, the legs being extended along abdomen and chest of fetus, and buttocks only presenting. (3). **Footling and Knee** presentations are variations of complete breech, with prolapse of a lower extremity.

Frequency—Breech presentations occur in 3% of all labors.

Nomenclature—As in cephalic presentations, the position is named from the relation of a fixed point on the presenting part (the sacrum), to the four quadrants of the maternal pelvis. The four common positions are as follows:

1. Sacro-laeva-anterior, L.S.A., sacrum to left acetabulum.
2. Sacro-dextra-anterior, R.S.A., sacrum to right acetabulum.
3. Sacro-laeva-posterior, L.S.P., sacrum to left sacro-iliac synchondrosis.
4. Sacro-dextra-posterior, R.S.P., sacrum to right sacro-iliac synchondrosis.

Etiology—Some cause that prevents the lower uterine segment from fixing the head at the inlet. (1) Premature labor. (2) Polyhydramnion. (3) Multiple pregnancy. (4) Hydrocephalus. (5) Placenta Previa. (6) Obstruction at the brim.

Diagnosis—External examination: (1) Longitudinal presentation. (2) Back to left or right. (3) Breech over inlet. (4) Head in fundus. (5) Fetal heart apt to be above umbilicus.

Internal examination: (1) Genital groove. (2) Tuberosities of ischia separated by genital groove. (3) Anus. (4) Fetal sacrum. (5) Lower extremity.

Head	vs.	Breech
1. Hard, bony feel.		1. Soft except over sacrum.
2. Spherical, regular.		2. Oval, irregular.
3. Separated from body by crease of neck.		3. Continuous with outline of body.
4. Movement independent of body a/c neck.		4. Cannot move independent of body.

Breech	vs.	Face
1. Head in fundus.		1. Head over inlet.
2. Anus—no bony ridges.		2. Mouth—bony alveolar ridges.
3. Tuberosities separated by groove.		3. Malar eminence separated by bony ridge.
4.Meconium from anus.		4. None.
5. Spines of sacrum.		5. None.

Foot	vs.	Hand
1. Sole oblong.		1. Palm square.
2. Inner border thicker than outer.		2. Uniform thickness.
3. Toes in straight line.		3. Finger lengths differ.
4. Right angle to leg.		4. Same line with arm.

Mechanism—There are three distinct mechanisms to be considered, i. e., (1) Mechanism of breech, or bitrochanteric diameter. (2) Mechanism of shoulders, or bisacromial diameter. (3) Mechanism of the head, or subocciptobregmatic diameter. The left sacro-anterior position will be given as an example.

(1) Breech.

a. Descent, with bitrochanteric diameter in left oblique. This continues until the breech reaches the pelvic floor.

b. The anterior, or left hip, descends more rapidly than the posterior, and hence reaches the pelvic floor first. Since the most dependent

part rotates anterior, this hip then rotates, through an arc of 45 degrees, until it rests beneath the symphysis. This is a fixed point, since the trochanter becomes firmly impinged in this position.

c. The interior, or left hip, being fixed, but the forces of labor continuing, the posterior hip is forced over the perineum in lateral flexion.

(2) Shoulders.

a. Descent takes place with the bisacromial diameter in the same oblique which was occupied by the hips, i. e., the left oblique.

b. The anterior, or left shoulder, rotates to the pubes, and as descent continues, becomes fixed beneath the pubic arch.

c. The posterior, or right shoulder, is swept outward over the perineum.

(3) Head.

a. Flexion due to pressure of the fundus upon the vertex.

b. Descent, the suboccipitobregmatic diameter occupying the right, or opposite oblique, to that occupied by the hips.

c. Anterior rotation of the occiput, the external occipital protuberance becoming fixed beneath the pubic arch.

d. The forces continue to flex the head, so that the chin escapes over the perineum, followed by nose, forehead, bregma and last of all, occiput.

Anomalies—Very rarely there is posterior rotation of the occiput. If the head remains well flexed the face, forehead and occiput pass under the symphysis in this order. If the head is extended the chin becomes fixed against the pubis, while vertex, forehead and face pass over the perineum.

Prognosis—Maternal risk slightly increased from prolonged labor, cervical and perineal lacerations.

Fetal mortality is from 5% to 20%, depending upon the management. The great danger to the fetus is asphyxia, and the problem is to get air into the lungs within five to eight minutes after the funic circulation

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is interfered with. Any cause that disturbs the normal relations of the fetus and placenta predisposes to asphyxia, and it is important to understand these factors in order to properly manage the case.

Dangers to the Fetus in Breech Labor—1. The decreasing area of the placental site. Before labor begins, the placenta exactly fits the placental site, but as soon as the fetus begins to leave the uterine cavity, the uterine wall retracts and the placental site becomes too small. The placenta, in order to accommodate itself to the change, can shrink to a moderate extent, but not to the same degree as it can after the child is born, and therefore the blood is allowed to escape from the cord oxygenator is abolished when the delivery of the lower angle of the scapula, the placenta is so encroached upon that the child fails to receive sufficient oxygen from the maternal blood. Although the placenta is not normally separated from the uterine wall until the third stage of labor, yet its function as an oxygenerator is abolished when the delivery of the fetus has reached this point. The greater the mass of fetus lying within the uterine cavity, the less the danger of asphyxia, and the slower the birth may proceed with safety; the greater the mass expelled, the faster must be the delivery. The appearance of the umbilicus at the vulva is, therefore, an indication to proceed with the extraction, unless the powers of labor are so strong as to bring about a spontaneous delivery within the specified time.

2. **Pressure on the cord,** between the pelvis and the body of the fetus, occurs to a certain extent when the umbilicus has entered the pelvis, but the more serious results occur during the passage of the head through the bony canal. This is especially true in a generally contracted pelvis, where considerable moulding has taken place.

3. **Displacement of the arms over the head.** When the body is expelled by the natural powers of labor, the arms are usually found in a state of flexion over the chest. Artificial traction from below tends to strip the arms up along the side of the head, and their removal must be effected before the head can enter the inlet. The more difficult the extraction of the arms, the greater is the danger of asphyxia. The best prophylactic treatment is to have an assistant press down on the fundus as the body is being delivered, thus keeping the uterine walls in contact with the fetal head.

4. **Premature respirations** are caused primarily by a lack of oxygen and an excess of carbon dioxide within the fetal body, and secondarily, by the application of cold to the part already born. It is well to cover the body while it is being born with a warm, moist sterile towel, in order to prevent premature respiration as well as to enable the attendant to securely grasp the slippery body. A premature respiration is a positive indication for the rapid termination of labor.

5. **The head may become pinhcled** by the cervix retracting down upon the neck in cases where breech extraction has been done before the cervix was completely dilated. The cervix, if drawn down to the outlet, is seen as a tight purple band.

6. **Injuries.** The fetus is exposed to injuries because of the fact that great traction is made upon delicate portions of the body, and that these tractions are not made in the axis of the inlet. A further reason lies in the fact that these extractions are always rapid. Fractures of the femur, humerus and skull, lacerations of the soft parts and injuries due to pressure on abdomen or nerves of the neck, may occur.

Treatment—During pregnancy at about the end of the eighth month a cautious attempt may be made to convert a breech into a cephalic presentation by external manipulation. I have never seen this successfully done.

During labor the conduct of the case may be divided into three periods, as follows:

First period, from the beginning of labor to the birth of the umbilicus. During this period a strict policy of watchful expectancy is indicated. Since the breech is a poor dilator, this is likely to be a tedious period.

Fetal heart should always be taken every hour during the first stage of labor in a breech, and every five minutes during the second stage.

Posture is not important during the early stages of labor, but the patient should be in the dorsal position as soon as the cervix is dilated completely.

Preparation for an operative delivery should be made during this period. Instruments should be at hand, sterile dressings, and means of caring for the asphyxiated child. In a private home an improvised operating table should be ready, since every breech should be delivered upon a table and not upon a bed.

As the vulva is distended by the breech, the patient is placed upon the table, her limbs supported by assistants, and should be encouraged to bear down. As the presenting part appears, it is wrapped in a hot, moist, sterile towel.

Make no traction on the presenting part unless there is a scientific indication for rapid delivery.

Second period, from the birth of the umbilicus to the birth of the mouth. This is a period of activity. This period must not last more than eight minutes if a living child is to be delivered.

A loop of cord is drawn down as the navel appears at the vulva, to avoid traction on the umbilicus.

The fundus uteri is to be controlled by an assistant, who is instructed to carefully follow down the fundus, pressing it with both hands, and keeping it contracted on the fetal head. This will aid in preventing extension of the arms, and hasten delivery.

Anaesthesia is started at the beginning of this period and carried to a surgical degree.

Traction is now made until the scapulae appear.

Manual aid consists in the extraction of the arms and head in breech labor. This should begin when the scapulae appear. The first act of manual aid is given by lifting both feet of the fetus towards the mother's groin that lies nearest the child's abdomen. In other words, if the back points right, carry the feet towards the mother's left groin. In order to make the shoulder and arm as accessible as possible, lift up on the body, and by a leverage action, the os pubis being the fulcrum, the elbow will often be felt to descent several centimeters into the pelvis. The posterior shoulder is now rotated into the hollow of the sacrum and two fingers of that hand whose palm points towards the back, are passed along the back and over the posterior shoulder, hooking down the arm by the elbow. We aim to push the elbow across the face and anterior chest. The fetus is now rotated through an arc of 180 degrees, keeping the back anterior, and bringing the second shoulder into the hollow of the sacrum. The second arm is now delivered.

As the arms are delivered the head enters the pelvis. Two conditions should be present before extraction. (a) The head should be flexed.

(b) The occiput should be rotated under the os pubis. If these conditions are present, we may extract by the **Mauriceau-Smellie-Veit method.** The fetal body straddles the left forearm, while the two fingers of the left hand are inserted into the mouth to maintain the flexion of the head. Two fingers of the right hand are passed over the shoulders on either side of the neck. Traction is then made downward in the axis of the inlet, until the occiput has passed under the pubis. The body is then gradually raised until it comes to lie over the abdomen of the mother. The mouth now appears over the perineum.

Third Period. When the mouth appears we should proceed slowly, since there is now little danger of asphyxia, but great danger of laceration. Deliver slowly, retracting perineum and wiping out baby's mouth, if necessary.

COMPLICATIONS OF BREECH PRESENTATION AND THEIR TREATMENT

Premature Rupture of Membranes

Because the breech is such an irregular, inefficient dilator, this is a frequent complication. It results in a marked prolongation of labor, with greatly increased danger to mother and child.

The introduction of a large sized colpeurynter will counteract this tendency by supplying an artificial hydrostatic dilator. In many primiparae I introduce the colpeurynter as a prophylactic against premature rupture of the membranes and uterine inertia.

Posterior Rotation of the Breech

In favorable cases the fetal back and then the occiput rotate under the symphysis. It should be our purpose to attempt anterior rotation of the trunk up to that period in the extraction when the occiput has entered the inlet. It is rare that anterior ortation falls if the case has been properly managed.

Before attempting to deliver the occiput posteriorly, we should endeavor to secure anterior rotation by **Tarnier's method.** Two fingers of one hand are passed over the posterior mastoid process, while the other hand lies over the anterior malar bone. An attempt to rotate by this method is often successful.

If anterior rotation fails we may deliver by one of two methods.

1. **Reversed Smellie-Veit**—The fetus lies with its back upon the right forearm, the fingers surrounding the neck. Two fingers of the left hand make traction on the lower jaw in order to maintain flexion. Traction is now carefully made, in a downward and backward direction, until the forehead impinges behind the os pubis. Great care should always be taken in extracting the head on account of the danger of extensive lacerations. If the forehead is not low down behind the pubis, pressure upon the nose during extraction may result in its fracture. When the forehead lies beneath the pubis, the direction of traction is raised and the child is finally delivered with the body lying over the abdomen of the mother.

2. **Van Hoorn's Method** (Sometimes called Scanzoni's)—This method is used if the head is high above the inlet. The fetus rests on one forearm, the fingers of that hand grasping the neck. Traction is made from below, while the second hand makes supra-pubic pressure and forces the head into the pelvis. The trunk is now brought up over the mother's abdomen, and the occiput, brow and face are successively delivered over the perineum.

Arms in the Nape of the Neck

A rare complication is to find one or both arms in the nape of the deck. This may occur when the fetal body has been rotated artificially while the head is flexed. The diagnosis is impossible until the operator attempts to bring down the arms by manual aid. Usually only one arm is displaced, the other lying over the chest or along the side of the head. As the occiput usually lies anterior, the displaced arm may be felt between the head and the os pubis.

The condition may usually be overcome by rotating the trunk away from the side on which the obstructing elbow lies. This tends to cause the fetal arm to slide to the side of the head, from where it may be brought down.

If this fails we may attempt to fracture the arm and extract, always remembering that a living child with a fractured arm is better than a dead child with the arm intact.

Difficulty in Delivery of Aftercoming Head

Occasionally the Mauriceau-Smellie-Veit maneuver is not successful, and since the second period of breech de-

livery must not consume more than eight minutes if a living child is to be extracted, we must not waste valuable time if this method fails, but must use other means.

Wiegand-Martin Method of Delivery of Aftercoming Head—This method is particularly valuable in a flat pelvis. The child's belly straddles one forearm, as in a Smellie-Veit, and the two fingers of this hand are passed into the mouth and flex the head by drawing down the lower jaw. The operator places his other hand on the mother's suprapubic region and makes direct pressure upon the head. The head is brought into the cavity of the pelvis by combined pressure from above and traction from below.

Walcher's position is said to increase the conjugate from 8 to 15 mm. If we are unable to force the head into the inlet while the patient is in the dorsal lithotomy position, the patient is brought down to the foot of the table so that her hips are close to its edge, and her limbs are allowed to hang unsupported, or are held down forcibly by an assistant. This posture brings the axis of the uterus and the axis of the birth canal into line.

Prague Method—This may be used where it is not possible to reach the mouth with the fingers. The operator stands to the left side of the patient and seizing both feet with the left hand, carries them upward and forward towards the mother's abdomen. The right hand is placed over the neck, two fingers lying on either side of it, and traction is made downward and forward, using the os pubis as a fulcrum. Supra-pubic pressure, by an assistant, is very useful in aiding this maneuver.

The objections to this method are that all the force is brought to bear upon the neck, and that traction upon the neck predisposes to deflexion of the head.

Forceps on the Aftercoming Head—If the operator is still unable to bring the head into the cavity, forceps may be used on the aftercoming head. Technique will be given in the course on operative obstetrics.

BREECH EXTRACTION

Indications—Labor in a breech presentation should not be interfered with except for some scientific reason. (1) Fetal asphyxia. (2) Maternal exhaustion. (3) Maternal complications, such as eclampsia, acute and chronic pulmonary or cardiac conditions, giving

threatening symptoms, placenta previa, premature separation of placenta, etc., etc.

Conditions—Before we proceed to extract the fetus we must be satisfied that four conditions are present: (1) The cervix must be effaced and completely dilated. This condition may be artificially secured, if it is not present when the indication for extraction arises. (2) The pelvis must be sufficiently large to permit the passage of the full term child. Breech extraction should never be attempted if the true conjugate is less than 8 cm. in a flat, or 8½ cm. in a generally contracted pelvis. In funnel-shaped pelves these measurements also apply to the transverse of the outlet. There should be no tumors to encroach to any extent upon the pelvic diameters. (3) The membranes must be ruptured. This condition is easily secured. (4) The child should be living. It is not good obstetrics to forcibly extract the dead child at the expense of the maternal tissues, since a craniotomy upon the dead child will enable us to prevent to a large extent any maternal injuries. If the child is dead, unless the maternal indication is urgent, it is best to wait for spontaneous delivery.

Technique of Breech Extraction—This will depend upon whether or not the breech is engaged, and upon the attitude of the breech. Patient on operating table, dorsal lithotomy position, surgically prepared, and under surgical anaesthesia. This is a major obstetric operation. Four methods may be used to complete the extraction in the first period of breech labor. In the order of preference these are:

1. **Bringing down one leg,** and delivering by traction upon this leg. The object is to make traction on that foot which will keep the back anterior. For theoretical reasons, therefore, it is best to bring down the anterior foot. From a practical standpoint, however, I do not believe this is an important point, and bring down the first foot with which my hand comes in contact. In a complete breech there is no difficulty in reaching a foot, since one or both feet are presenting with the buttocks. In a frank breech it is more difficult to extract a foot, because of its position along the side of the upper abdomen or fetal chest. There are three methods of getting a foot in a frank breech. (a) **Pinard's Method**—Pass two fingers along the anterior thigh to the knee and push the knee away from the median line of the body. Abduction of the

knee always causes more or less flexion of the leg, and during this flexion it can usually be grasped and brought down without difficulty. This is the best method. (b) Where the liquor amnii is abundant and the limbs are movable, especially in multiparae, pass the fingers up to the knee and tap the popliteal space. Under favorable conditions the foot will be kicked into the hand by reflex action. (c) If these methods fail, the hand may be introduced into the uterine cavity and a foot brought down by main force. Great care should be used.

I have never seen a case where it was impossible to bring down a foot.

2. **Traction in the Anterior Groin**—This is especially applicable to frank breech labors. Two fingers are passed up to the anterior groin and hooked over the thigh. The fingers are placed single file, one upon the other. Care should be taken to avoid fracture of the femur. As the anterior buttock descends into view it may be possible to insert a finger into the posterior groin, and aid in delivery. This is a difficult and tiresome maneuver, and before it is attempted every effort should be made to bring down a foot, as described in other methods.

3. **Delivery with a Fillet**—If it is impossible to either bring down a foot or make sufficient traction in the groin to effect delivery, a piece of sterile gauze, or better, a soft rubber catheter, threaded with a stout cord, may be passed over the anterior groin and brought out between the thighs. Traction is then made upon the sling until it is possible to get a firm hold upon the groin.

This maneuver results in extensive injuries to the fetus and should not be undertaken unless it is absolutely impossible to deliver by the other methods.

4. **Blunt Hook in Anterior Groin**—This is never used unless the child is dead, since it invariably results in great destruction of the tissues of the thigh. It is better to extract with a cranioclast if the three methods given above fail.

When the breech is delivered, the extraction is completed as outlined under the head of "Manual Aid."

TRANSVERSE PRESENTATIONS (CROSS-BIRTH)

Def.—Presentation of any part of the fetus other than the upper or lower pole, usually the shoulder.

Frequency—About 1 in 200, or ½%.

Etiology—Any cause that interferes with the entrance of either fetal pole into the pelvic inlet, and its maintenance there, predisposes to a cross birth. Chief among these causes may be mentioned the following: (1) Contracted pelves. (2) Polyhydramnion, in which the uterine wall is unable to retain the long fetal axis in its proper relation. (3) Multiple pregnancy, for the same reason. (4) Tumors of the cervix, pelvis, etc., including the placenta in placenta previa. (5) Macerated, hemicephalic and microcephalic fetuses. (6) Premature labors, before the fetus has been fixed by the uterine walls. (7) Sudden rupture of the membranes, with the patient in the upright or standing position, and sudden escape of the liquor amnii.

Nomenclature—The fixed point on the fetus which is used to distinguish position is the scapular portion of the back, or dorsum. There are four positions which must be distinguished:

1. Dorso-laeva-anterior, L.D.A., back anterior, head to mother's left.
2. Dorso-dextra-anterior, R.D.A., back anterior, head to mother's right.
3. Dorso-dextra-posterior, R.D.P., back posterior, head to mother's right.
4. Dorso-laeva-posterior, L.D.P., back posterior, head to mother's left.

(NOTE: Scapula is substituted for dorso by many authors. The meaning is the same. The abbreviation for scapula is Sc. Positions given above would be L.Sc.A., R.Sc.A., R.Sc.P., L.Sc.P.)

Diagnosis—Externally we find the distance between the enciform cartilage and the fundus uteri is greater than is normally found in a full term pregnancy. Normally in longitudinal presentations this measures about 7½ Cm. Attention should be directed to two possible errors in this measurement. The distance from the enciform may be increased by the presence of a diastasis of the recti muscles, and the resulting pendulous abdomen. In the second place, the measurement varies with the height of the head in the pelvis, being increased when the head lies upon the pelvic floor, and decreased when it lies above the inlet. In taking this measurement care should be taken to see that the uterus lies near the posterior wall of the abdomen, and that the head does not lie upon the pelvic floor. Although it should be remembered that polyhydramnion, which is frequently associated with cross births, would tend to counteract this change, still a moderate increase in this diameter is suggestive. The transverse diameter of the uterus normally is 22 Cm. If this diameter is increased up to 28 Cm. or more, we must consider three conditions, i. e., polyhydramnion, multiple pregnancy, and cross birth. In cases of hydramnion and multiple pregnancy, both the transverse and the longitudinal diameters of the uterus are increased, but

in a transverse only the transverse diameter is affected. Our first maneuver shows that the presentation is transverse, the second maneuver shows that there is no fetal pole over the inlet; the third maneuver shows that there is no fetal pole in the fundus; the fourth maneuver shows the presence of either back or small parts, lying transversely across the lower abdomen. The fetal poles occupy the iliac fossae. The head is distinguished from the breech as outlined under "Breech Presentations." The location of the fetal heart is not characteristic.

Internally, the pelvic inlet is empty, or is occupied by the shoulder or a prolapsed arm. If an arm it should be identified in order to confirm our diagnosis of the exact position. This is best done by "shaking hands with the baby," thus determining whether the right or left hand is down.

There are four possible terminations of cross birth, if artificial assistance is not given:

1. During pregnancy a spontaneous change from a transverse presentation to a head or a breech may take place without the patient being aware of its occurrence. This is called **spontaneous rectification.**

2. Occasionally, under the influence of the first few pains of labor, the presentation is corrected and the cases terminates as a head or a breech. If this occurs (during labor) it is called **spontaneous version. Never rely upon this.**

3. **Spontaneous Evolution** is defined as that form of delivery in which the fetus attempts to pass through the pelvis without the preparatory change to a head or a breech presentation. This can only occur in premature labors, with the fetus small or macerated, a very large pelvis, and very strong uterine contractions. Under these conditions nature occasionally succeeds in crowding one part of the fetus past the other, and delivering the child. Thus the breech may be crowded past the shoulder and delivered first, or more rarely, the fetus may be folded on itself and expelled as one mass. This latter mechanism is called **conduplicatio corpore.** Spontaneous evolution is never to be expected.

4. **Rupture of the Uterus**—If the child is at term and the woman in labor, the most common termination of a cross birth is rupture of the uterus. The child always dies, and usually the mother. Signs and symptoms of threatened rupture of the uterus are carefully

discussed under the heading of "Anomalies of the Forces."

Treatment

The presence of a cross birth in labor is a positive indication to interfere. It is absolute dystochia. The earlier the diagnosis is made the better is the prognosis. The later a version is performed after rupture of the membranes, the worse is the outlook for both mother and child.

Version is the treatment for a transverse presentation, **except** in the presence of a tetanic condition of the uterus.

During pregnancy external cephalic version may be attempted, but the results are not satisfactory.

During labor, if the dilatation is less than three fingers, the membranes intact, the introduction of a "complete dilatation size" Voorhees bag, taking unusual precautions to avoid rupture of the membranes during its introduction, will give ideal results. As the bag is expressed the patient should be placed under surgical anaesthesia and internal podalic version performed.

If the membranes are ruptured, or if they are intact, but there is more than three fingers dilatation, surgical preparation, anaesthesia and internal podalic version, **at once.**

Neglected Transverse Presentation is a term applied to a transverse in which signs of threatened rupture of the uterus, Bandi's ring, etc., are present. Embryotomy is our only treatment, since any attempt at version will cause a rupture of the uterus. Cesarian section should not be considered on account of the danger of infection.

FACE PRESENTATIONS

Definition—A face presentation is a cephalic presentation, with the head completely extended.

Frequency—Occur in one-half of 1% of all cases, or 1 in 200 cases.

Etiology—Any factor which will either interfere with flexion, or cause extension, such as (1) multiple coils of umbilical cord around the neck, (2) congenital goitre, or other tumors of the neck, (3) hydrothorax, (4) resistance which prevents or retards the occiput from entering the pelvis, such as contracted pelvis, tumors, etc., (5) dolichocephalus, as a result of the occiput impinging on the brim of the pelvis, (6) monsters, such as anencephalic, etc. **I regard deformed pelves as the most common cause.** Some authors regard (7) obliquity of the uterus as an important factor.

The majority of face presentations are not primary, but occur during labor as a result of some factor causing extension or preventing flexion.

Nomenclature—In a face presentation the chin, or mentum, is the fixed point on the presenting part whose relation to the quadrants of the maternal pelvis determines the

position. There are four important positions—

1. Mento-laeva-anterior, L.M.A., chin to left acetabulum.

2. Mento-dextra-anterior, R.M.A., chin to right acetabulum.

3. Mento-laeva-posterior, L.M.P., chin to left sacro-iliac synchrondrosis.

4. Mento-dextra-posterior, R.M.P., chin to right sacro-iliac synchondrosis.

Diagnosis—(1) Longitudinal presentation. (2) Head in inlet, with marked cephalic prominence on same side as back. The bony head appears almost entirely absent on the opposite side of the pelvis, and the fingers can be deeply depressed into the inlet on this side. There is a deep droove between the back and the roundd pole of the extended occiput. (3) Breech in the fundus. (4) Back on side corresponding with cephalic prominence. (5) Location of fetal heart not characteristic.

Internal examination shows (1) Malar eminences, (2) Nose, (3) Mouth, (4) Eyes, supra-orbital ridges. Differentiate from breech presentation. (q.v.) Brow. Anencephalic monster.

Mechanism—The several stages in the mechanism of a face are: (1) Extension; (2) Descent; (3) Anterior rotation of the chin; (4) Flexion; (5) External restitution. The mechanism is easily understood by remembering that the chin is the mechanical equivalent of the occiput, and follows the same mechanical movements as does the occiput in vertex presentations.

Mechanism of Left Mento-Anterior Position

Extension—This is primarily due to the factor which is responsible for the anomaly. In the presence of moderate extension, the occipito-mental diameter is forced into the plane of the pelvic inlet.

Further extension is now caused and maintained as a result of the forces acting upon the two armed lever, which in a face presentation is the occipito-mental diameter, divided into a short arm, between the condyles and the mentum, and a long arm, between the condyles and the occiput. When the resistance of the pelvic girdle is encountered, the forces act to greater mechanical advantage upon the short arm, forcing the chin downward, and the occiput upward.

Descent—The fronto-mental diameter, 8½ Cm., enters the inlet in the right oblique, with the chin towards

the left ileopectineal eminence. As a result of the forces of labor, descent takes place.

Anterior Rotation—The most dependent portion of the presenting part is the chin. As the chin meets with the resistance of the pelvic diaphragm it rotates anterior through an arc of 45 degrees, until it is brought beneath the public arch, and becomes fixed.

Flexion—The occipito-mental diameter now becomes a one-armed lever, with the chin as its fixed point. The chin is fixed beneath the symphysis, and since the forces of labor continue, the posterior end of the lever (the occiput) is forced downward along the posterior wall of the pelvis, while the forehead, bregma and finally the occiput, are forced outward over the perineum.

External Restitution—As the occiput passes over the perineum, it drops down toward the anus, and the chin is released from beneath the symphysis. The chin now rotates through an arc of 90 degrees, toward the mother's left thigh, (the thigh towards which it was directed in utero). External restitution results from the engagement of the shoulders in the left oblique.

Mechanism of Left Mento-Posterior Position

The usual mechanism is as follows:

1. Extension.
2. Descent. The fronto-mental diameter enters the inlet in the left oblique, with the chin towards the left sacro-iliac synchondrosis.
3. Anterior rotation of the chin through an arc of 135 degrees. becoming fixed beneath the public arch.
4. Flexion.
5. External restitution.

Posterior rotation of the chin, into the hollow of the sacrum, occurs in a small percentage of mento-posterior positions. If this takes place, the mechanism stops, and the completion of delivery is mechanically impossible.

Persistent mento-posterior positions are an obstetrical impossibility—It is necessary for the chin end of the occipito-mental diameter to escape over the edge of the perineum before it can possibly execute the movement of flexion. The length of the fetal neck from the sternum to the chin is 5 Cm. This can easily subtend the anterior pelvic wall of 3 to 5 Cm., but is entirely too short to subtend the posterior pelvic wall of 25 Cm., (made upof the distance from the center of the promo-

tory to the tip of the coccyx 12½ Cm., and the distance from the tip of the coccyx to the edge of the perineum, 12½ Cm.)

Hence after posterior rotation of the chin the child's sternum impinges upon the sacral promontory, or perhaps begins to descend a little below that point, and then becomes arrested. The chin is thus arrested in the pelvis while it is still far above the tip of the coccyx, and cannot escape over the perineum to perform flexion.

The occiput is jammed against the fetal back, and the wedge thus formed by the body and the head is crowded down into the pelvis. It cannot pass through, for the combined diameters of the head and thorax, 19 Cm. (made up of dorsosternal 9½ Cm., and suboccipitobregmatic, 9½ Cm., is far greater than the greatest available diameter of the pelvis, 12 Cm. Impaction is thus inevitable.

Prognosis—The fetal mortality is high, due to the extremely tedious labors, pressure on brain, and frequency of operative delivery.

The danger to the mother from tedious labor, exhaustion, sloughs, sepsis and postpartum hemorrhage, results in an increased maternal mortality.

Treatment—(1) If the pelvis is normal and the child normal and alive, mento-anterior positions should be treated expectantly. Under these conditions a large percentage of cases will terminate spontaneously. Careful and frequent auscultation of the fetal heart will enable us to interfere if fetal asphyxia appears. It should be our aim to preserve the membranes in every case of face presentation, until the cervix is completely dilated. The membranes are liable to rupture early in these cases, and we endeavor to prevent this by restricting vaginal examinations, avoiding vaginal manipulation, cautioning the patient against bearing down in the first stage of labor, keeping the patient in bed throughout labor, and in selected cases introducing a large sized colpeurynter.

(2) In mento-anterior positions, if an indication to terminate labor arises, on the part of either mother or child, an internal podalic version will give best results if the head is not engaged. Forceps operations in these cases are very difficult unless the head is low in the pelvis and the chin rotated anterior.

(3) The object most desired in mento-posterior positions is flexion of the head, by which the face, with

chin posterior is converted into a vertex, with occiput anterior. Theoretically this may be accomplished by either external, internal or combined methods. The prnciple of these maneuvers is to loosen the head from inlet, and favor descent of the occiput. I have never seen any obstetrician accomplish this.

If impossible, the method of choice would be an internal podalic version, early in labor.

If conversion to a vertex is impossible, and version is contraindicated, the face should be allowed to descend into the pelvis with the chin posterior, with the hope that anterior rotation wll take place, either as the result of tlre powers of labor, or by forceps rotation.

If this fails, craniotomy is usually the procedure of choice.

Cesarian section should be considered in mento-posterior cases, early in labor.

ABNORMALITIES OF MEMBRANE AND CORD

Short Cord

Definition—The umbilical cord averages 50 Cm. in length. If the cord is less than 25 Cm. in length, it is known as an absolutely short cord, since the length of the cord necessarily to permit a spontaneous delivery is 25 Cm. If the cord is of normal length, but is entwined about the body or neck so as to produce the same effect as a short cord, it is called a relatively short cord.

Etiology—Not known. May recur repeatedly.

Diagnosis—(1) Severe, localized pain over the placental site during a contraction. This is due to the increased tension on the cord as the fetus is forced further away from the placenta during a uterine contraction. (2) A sudden retrogression of the fetus upon the subsidence of the contraction. This is caused by the elasticity of the cord, with resulting pull upon the head, such as would be seen if a ball were attached to the end of a rubber band. If the child is firmly fixed in the pelvis, this sign is absent. (3) A desire to urinate frequently between pains. Reflex. (4) Arterial hemorrhage during and between pains. (5) Marked alterations in fetal heart tones during the pain. It must be remembered that the fetal heart varies during a uterine contraction, but this is accentuated in a short cord, due to interference with fetal circulation.

If the cord is relatively short, it may slip off the fetal body, and the case immediately become normal. Should the signs of a short cord cease suddenly, the fetal heart tones should be auscultated. If they are normal in rate and quality, and the mother is in good condition, the case is a normal one. If the heart tones are rapidly increasing in rate and are becoming weaker, and there is no evidence of premature separation of the placenta or inversion of the uterus, it is probable that we are dealing with a rupture of the cord. Unless immediate delivery takes place, the child will die.

Terminations—(1) Premature separation of the placenta. Most frequent. (2) Inversion of the uterus. (3) Rupture of the cord. (4) Delay in the second stage of labor. (5) Asphyxia and death of the fetus.

Treatment—Watchful expectancy. Immediate delivery if fetal asphyxia or premature separation of the placenta are diagnosed.

Prolapse of the Umbilical Cord

Definition—The descent of the umbilical cord into the pelvis, in advance of the presenting part, is called prolapse of the cord. It is assumed that the membranes have ruptured.

Forelying Cord—This is a condition in which a loop of cord descends in front of the presenting part, but the membranes are intact.

Frequency—Approximately 1%.

Etiology—Any cause that prevents the accurate and continuous adaptation of the presenting part to the inlet, predisposes to prolapse of the cord. (1) Deformed pelves, (2) Malpresentations of the fetus, particularly transverse, brow, face, breech, (3) Hydramnion, on account of the high station of the presenting part at the time the membranes rupture. (4) Relaxed uterine walls, (5) Multiple pregnancy, (6) Sudden rupture of the membranes when the patient is in the upright position, (7) Operative interference.

Dangers—Maternal: No greater than in normal labor, except as a result of operations which may be undertaken as a result of the condition. **Fetal:** Asphyxia, due to the compression of the cord between the presenting part and the bony pelvis. The greatest danger is in vertex presentations. Fetal mortality is over 50%. There is very little danger to the fetus before rupture of the membranes, hence a forelying cord is of interest chiefly because the condition always results in a prolapse of the cord as soon as the membranes rupture.

Diagnosis—Before rupture of the membranes, the pulsating cord, lying between the membranes and the presenting part, is characteristic. If the cord is not pulsating, it

must be differentiated from a fold in the scalp, after rupture of the membranes. Especial care should be taken to avoid the rupture of the membranes in a forelying cord, before the necessary preparations for operation are completed. **After rupture of the membranes,** the loop of cord in the vagina or at the outlet can scarcely be mistaken for anything else if the possibility of the condition is always borne in mind. Several ludicrous mistakes in which this condition has been mistaken for a rupture of the uterus, with prolapse of the intestine through the rupture, have come under my observation. The absence of the mesentery, and the presence of the characteristics of the umbilical cord, will make the diagnosis clear.

Treatment—If the child is dead, there is no reason to interfere, except upon some indication other than this condition. For instance, with a vertex presentation, prolapsed cord, dead baby, normal pelvis, mother in good condition, we would allow the case to deliver spontaneously. On the other hand, if the case were a transverse presentation, with a prolapsed cord and a dead baby, there would be an indication to interfere, since the transverse presentation, and not the prolapsed cord, would endanger the mother's life.

If the child is alive, the membranes unruptured, **(forelying cord,)** and the cervix dilated to less than three fingers, the introduction of a complete dilatation sized colpeurynter will prevent premature rupture of the membranes, and will prepare the cervix for an internal podalic version, and extraction, when the colpeurynter is expelled. If the cervix is dilated to more than three fingers, or if even less dilation is present, but the cervix is dilatable, a manual dilation followed by a version and extraction, will give excellent results.

While the child is usually in no danger as long as the membranes are unruptured, it must be remembered that spontaneous rupture may occur at any time, and the presence of a forelying cord is always an indication for some active interference in the interests of the child.

If the child is alive and the membranes ruptured, **(prolapsed cord),** the treatment will depend upon the conditions which are present. **In vertex presentations,** the instrumental or manual replacement of the cord has been advocated, but statistics from many maternities fail to show results which are equal to those which follow active treatment. If the **cervix is com-**

pletely dilated, version is the operation of choice unless the head is well engaged and capable of being easily and rapidly extracted with forceps. It must always be remembered that if more than eight minutes elapse between absolute obstruction of the circulation in the cord, and delivery, the child will be stillborn. If the **cervix is not dilated,** a manual dilatation, or possibly a vaginal Caesarian section, followed by version and extraction, will give best results. In **face presentations** the same principles are followed. In **breech presentations** extraction is indicated.

Postural treatment is recommended by some authors. This consists of either the knee chest position, or the exaggerated Trendelenburg, the object being to favor the gravitation of the cord toward the fundus uteri, and to prevent, by gravity, the descent of the presenting part into the pelvis. Practically, postural treatment is of value only during a short interval, such as might occur while preparations for operation were being made. The Trendelenburg position, with the patient under an anaesthetic, is sometimes of considerable value if a manual dilatation is required before the version is performed.

Since the pressure upon the cord is responsible for the asphyxia, the introduction of an entire hand within the vagina, with the object of preventing the descent of the presenting part, pending preparation for operation, is occasionally a valuable maneuver.

Prophylactic measures are of extreme importance in the prevention of this condition. Remembering that in malpositions, deformed pelves and polyhydramnion, prolapse of the cord is common, care should be taken that these cases are not in the upright position when rupture of the membranes is likely to occur. In the artificial rupture of the membranes, unless the presenting part is well engaged, great care should be taken in order to prevent a sudden gush of liquor amnii. The membranes in this case should be ruptured with a small pointed instrument such as a small Kelly hemostat. A small opening should be made and the liquor amnii allowed to drain off slowly. Too rapid draining of the liquor amnii should be prevented by plugging the outlet and vagina with the examining fingers.

ASPHYXIA NEONATORUM

Definition—A condition of the new born infant resulting from deficient oxygenation of blood. Apnoea, or ab-

sence of respiration, is the normal state of the fetus in utero. In the condition of apnoea the child is, however, receiving a sufficient supply of oxygen by means of the placental vessels. If, however, there is any interference with this circulation, the child suffers from lack of oxygen.

Etiology—With the complete separation of the mother and child, at birth, the blood supply to the child is cut off, and with this its supply of oxygen. The accumulation of carbon dioxide in the fetal blood irritates the respiratory center in the medulla, and this is ordinarily the cause of the first inspiration.

Any cause which will result in the deficient oxygenation of the fetal blood in utero, and hence the accumulation of carbon dioxide in the fetal circulation, will result in fetal asphyxia. 1. Premature separation of the placenta; prolapse of the cord and resulting pressure upon the cord; tetanic contraction of the uterus, resulting in pressure upon the placenta. 2. Cerebral compression in the fetus, with slowing of fetal heart and subsequent insufficient oxygenation of fetal blood; deficient oxygenation of mother's blood, as in eclampsia. 3. Injury to child, as in operative interference, frequently stimulates premature respiration and asphyxia.

Pathology—If intra-uterine respirations have occurred, the trachea and bronchi may be filled with aspirated mucus, liquor amnii and meconium. Edema of the brain, or even cerebral hemorrhages may be present. Partial atelectasis is usually present.

Diagnosis—Antepartum signs of fetal asphyxia are (1) Changes in the fetal heart tones. The normal fetal heart ranges from 120 to 150. An elevation of rate to or above 160 per minute, is always to be regarded with suspicion, and if the high rate persists, some degree of asphyxia is undoubtedly present. **Caution:** It must be remembered that there is a variation of the fetal heart during a uterine contraction. The novice must be careful in order that this variation may not be confused with the variation due to asphyxia. In asphyxia the variations in rate and quality are present between the uterine contractions. A low fetal heart rate is as significant as is the high rate. Any decrease in rate below 120 is characteristic of an asphyxia. Irregularity of the fetal heart is of extremely great importance in making the diagnosis. The normal fetal heart is strong and regular. Any irregularity, or variation in intensity, is characteristic. (2) The passage of liquor amnii stained with meconum, in presentations other than a breech, is an important diagnostic point. In a breech presentation, however, this point is of no value, since as a result of the compression of the breech during engagement and delivery, the meconium is mechanically forced out from the rectum. (3) Extremely active fetal movements during labor. Ordinarily the fetus is relatively inactive during labor. When as a result of some interference with the fetal

circulation there is an accumulation of carbon dioxide, the motor areas are stimulated, with resulting active fetal movements.

Postpartum signs of fetal asphyxia are easily recognized. There are two clinical types: **Asphyxia livida**—The child is born with a cyanosed skin. There is no immediate cry, but infrequent inspiratory gasps are noted. In this type muscular tone is present, i. e., the body is not flaccid. The heart beat is slow, but fairly regular. The cutaneous and pharyngeal reflexes are present. **Asphyxia pallida**—The child's skin is white, and the body is flaccid. All reflexes are absent, and the sphincter ani is relaxed. The heart beat is slow, very weak and irregular. Single spasmodic gasps may be made, but this is rarely the case.

Prognosis—In the antepartum asphyxias the prognosis will of course depend upon the condition of the child when it is delivered. If operative interference is attempted at the beginning of signs of asphyxia, the prognosis is good. On the other hand, if the attendant temporizes after making the diagnosis, or if he has not watched the case carefully, and overlooks the condition until the asphyxia is well advanced, the prognosis is poor.

In asphyxia livida the prognosis is good if the case is promptly and correctly treated. Even in this type, however, the prognosis given to the relatives should be guarded, since many of these children die even after regular respirations have been established. In other cases the children die of an aspiration pneumonia two or three days after delivery.

In asphyxia pallida the prognosis is very bad. Even if these children are resuscitated they usually doe during the first 48 hours. It should always be remembered, however, that as long as the fetal heart heats, there is hope of saving the child's life. The return of muscular tone in an asphyxia pallida usually is a favorable sign.

Treatment—In the treatment of asphyxia neonatorum there are four chief indications: 1. To clear the upper air passages. 2. To perform artificial respiration. 3. To employ reflex stimulation of respiration. 4. To preserve body heat. The following routine is advised. The discussion of other methods will follow.

Routine Procedure:

1. The child is held by the feet, the head hanging down. Gently slap the buttocks and soles of the feet.

2. Place the child upon a clean towel. It should lie upon its back. Aspirate the mucus and other secretions from the pharynx, passing the tip of the catheter down to the epiglottis. Aspirate the secretions from each nostril. Now "blow out" the air passages, by placing a piece of gauze over the mouth of the baby, and blowing through the gauze into the baby's mouth. As the attendant "blows out" the baby he should compress its stomach with his hand, so that it shall not be distended.
3. Place the baby in a tub of warm water. (Temperature should be 115 degrees F.) Sylvester's method of artificial respiration.
4. Laborde's method, or tongue traction. A mouse-tooth forceps may grasp the tip of the tongue, or a fine ligature may be passed through the tongue. The child should remain in the hot bath, its head well extended, and 20 to 30 tractions per minute should be made. This should be persisted in for several minutes. In my opinion this method is productive of the best results in the treatment of asphyxia.
5. The child should be placed on a table, and wrapped in a warm blanket. The lungmotor (not the pulmotor) should be used. To obtain good results with the lungmotor the head should be well extended, and the tongue threaded with a ligature and drawn well out over the alveolar margin. The infant mask should be used, and should be tightly placed over the baby's mouth and nose. A stethoscope should be used to determine whether or not air is reaching the base of both lungs. Under ordinary conditions air should be used in the lungmotor, but if stimulation is needed, a mixture of ½ air and ½ oxygen will give good results. About 60 strokes per minute should be used on a new born nfant.
6. Byrd's method may be used, alternating with Laborde's and the lungmotor.

After Care of Asphyxiated Infants—When respiration has been established the child should be placed in warm blankets and surrounded with hot water bags, (properly protected). The child should be watched constantly for the first twenty-four hours. Always remember that in these cases in which there has been a paralysis of the respiratory center, the child may stop breathing at any time, and may have to be resuscitated again. For stimulation brandy, in three drop doses every hour, has given me the best results.

Strychnia, by hypodermic, 1/300 grain at a dose, is also a satisfactory stimulant. **Keep the baby warm.**

Dangers in Treatment—Many babies are sacrificed as a result of too active treatment of this condition. The method of plunging a baby from a hot bath into a tub of ice water is only mentioned to be condemned. Such a procedure is unnecessary, and often results in such shock to the nervous system that death follows. The Schultze swinging method is of great danger to the child, and should only be used as a last resort.

SECTION III

Pathological Puerperium

CHAPTER 11

Puerperal Infection

Definition—Puerperal infection is a term used to comprise the various local and general pathological conditions resulting from the invasion of the parturient canal, during labor or the puerperium, by pathogenic organisms.

Etiology

Predisposing Causes—(1) Pregnancy.
(2) Shock of labor.
(3) Conditions which reduce the mother's vitality, such as hemorrhage, toxemia of pregnancy, etc.
(4) Prolonged labor.
(5) Operative interference.
(6) Retention of placenta, membranes, etc.
(7) Constitutional diseases, such as tuberculosis, syphilis, etc.

Exciting Cause—Streptococci, staphylococci, bacillus coli, gonococci, or any other pathogenic organisms.

Sources of Bacteria—Practically all cases of puerperal sepsis are contact infections, i. e., the patient is infected by bacteria which are brought to her from sources outside her own body. There are known as **heteroinfections**, or **exogenous** infections.

Heteroinfection—
1. **Time:** Ante, intra or postpartum.
2. **Sources:** Suppurative conditions, ulcers, gangrene, nasal infections, infectious diseases, especially erysipelas and scarletina, lochial blood, menstrual blood.
3. **Agent:** Physician, midwife, nurse or patient.
4. **How?** Faulty disinfection of hands or instruments; vaginal examinations and instrumentation; douches; infected dressings; bed-pans; coitus.

Autoinfection, or endogenous infection. Theoretically, but rarely in actual practice, a patient may be infected by bacteria which are already present in her body. The sources of such infection may be:

1. From bacteria in the genital tract, which become residents sometime before labor. They are usually relatively nonpathogenic during pregnancy. The gonococcus is an example.
2. From bacteria that migrate from organs adjacent to the parturient canal, as from the appendix, or from a pyosalpinx.
3. From bacteria which are carried in the blood stream from a distant site of suppuration, such as infected tonsils, to the genital tract.

CLASSIFICATION

Primary Foci of Infection—The primary site of infection is usually an obstetric wound of the perineum, vagina, cervix or the uterine cavity, particularly at the placental site.

1. Puerperal ulcers in the perineum and cervix.
2. Endometritis, from saphrophytes, pyogenic bacteria, or a mixed infection.

Secondary Sites of Infection—From the primary focus, infection spreads in one of three ways:

Extension by continuity—

1. Urinary tract. Cystitis, pyelitis, pyelonephritis.
2. Fallopian tubes. Salpingitis.

Extension by Lymphatics—

1. Uterus. Metritis. (Syn. Malignant endometritis.)
2. Pelvic connective tissue. Parametritis.
3. Pelvic peritoneum. Perimetritis. (Syn. Pelvic peritonitis.)
4. General peritoneum. Peritonitis.

Extension through Venous Channels—

1. Pelvic veins. Periuterine phlebitis.
2. Femoral veins. Phlegmasia alba dolens.

Blood States—Primary foci may or may not be associated with the more severe general conditions, or blood states. Toxinemia often occurs without bacteremia, but bacteremia is naturally associated with toxinemia.

1. **Toxinemia.** This is due to the absorption of—

a. Products of putrefactive bacteria. (Sapremia.)
b. Toxins of distinctive pathogenic bacteria.

2. **Bacteremia.** This is a condition in which bacteria circulate in the blood stream. (Syn. Septicemia.) **Pyemia** is a type of bacteremia apt to occur when one of the lesions is a thrombophlebitis. By the breakng off of a portion of a septic thrombus infected emboli are carried in the general circulation to previously uninfected tissues. Endocarditis and metastatic

abscesses are common results, but no portion of the body is exempt.

PATHOLOGY OF LOCAL RESISTANCE TO INFECTION

After delivery the parturient canal can be considered as a large, open wound. Healing takes place as in ordinary wounds. The endometrium is partially covered with a layer of necrosing decidua. Beneath this necrotic membrane an infiltration of leucocytes occurs, the number of connective tissue cells is increased, plasma cells are thrown out, and we have the formation of what is known as the protective zone. The function of this protective zone is to serve as a barrier against the further invasion of the tissues by the advancing bacteria, and to aid in the casting off of the dead decidua. It is thickest when the resistance of the tissues is greatest, and the infection least virulent. It is lease in evidence when the bacteria are of the most virulent type and the invasion most rapid.

The protective zone, therefore, is nature's protection against infection, and one of our greatest principles in the treatment of puerperal sepsis is, "Do not injure or destroy the protective zone."

By the sixth day epithelization is complete, except at the placental site. Here the thrombi in the open vessels require more time and different methods. Organization occurs in the thrombotic sinuses, the bank of granulation tissue thickens, and causes the exfoliation of the superimposed foreign material. This is usually complete in two weeks.

Puerperal endometritis is, therefore, the most common lesion of puerperal infection. Nature endeavors to localize puerperal infection within the parturient canal, and this is often noted, particularly if the organisms are of low virulence. Unfortunately, in some instances, on account of the virulence of the infection, and the low resistance of the tissues of the parturient canal, the protective zone is not capable of limiting the infection to the endometrium, and the bacteria spread to the uterine wall, the cellular tissue outside of it, the tubes and ovaries, and perhaps to any of the tissues or organs in the body.

INFECTION CLASSIFIED BY LOCALIZATION

Vulvar and Vaginal Infections

Etiology—Traumatism, in the presence of pathogenic bacteria. Perineorrhaphy.
Local Phenomena—"Puerperal ulcer" of greenish yellow appearance, due to necrosis. The ulcer is bathed in a foul secretion. Pus usually exudes from the stitches, if a perineorrhaphy has been done.
Symptoms—Slight temperature, with local pain and tenderness. Systemic disturbance is usually slight on account of good drainage. **This may be the initial focus of a more extensive infection.**

Puerperal Endometritis

This is the most common lesion in puerperal infection BECAUSE (1) The cervix and lower uterine segment are particularly exposed to the trauma of labor and operative delivery, (2) Lack of drainage in the horizontal position leads to: a. stasis of lochia, b. retained blood clots, membrane and placental fragments, (3) The uterine cavity is covered with dying decidua, which is favorable to bacterial growth, (4) The large open vessels at the placental site are favorable to the nidation of germs.
Local phenomena—Mucosa swollen, rough, thickened decidua in a state of necrosis, covered with foul secretion. Cervix usually involved, and puerperal ulcers present. In a virulent type of infection the uterine tissues may be invaded by bacteria, with extensive necrosis and uterine abscesses. (Latter called malignant endometritis.)
General phenomena—Vary according to kind and amount of toxins produced and to amount of absorption. Absorption depends upon: a, drainage; b, contraction of uterus; c, resistance of patient (local barriers).

Puerperal Salpingitis

Etiology—Nearly always gonorrheal.
Local Findings—Sausage shaped tumor with local tenderness.
General phenomena—Frequently has character of abscess formation, with rigor and temperature high.

Parametritis

Def.—Inflammation of pelvic connective tissue.
Etiology—Usually strepto, staph or coli, the atrium of infection being a wound of cervix, lower uterine segment, vagina or perineum.

Pathology—Organisms travel from atrium through the lymphatics to the subperitoneal connective tissue surrounding the uterus, i. e., broad, utero-vesical and utero-sacral ligaments. These bacteria and their toxins irritate the tissues, an inflammatory edema results, followed by a true exudate in the infected area. The peritoneum is nearly always involved, and pelvic contents are matted together.

Terminations—Abscess formation or absorption of exudate. The abscess points in 20 to 70 days: (1) usually in groin above Pouparts ligament, (2) posterior or lateral fornix of vagina, (3) along urethra to vulva, (4) neglected cases into rectum or bladder.

Local phenomena—Hard mass in broad ligaments, fixing uterus or pushing it to opposite side of pelvis. Tenderness.

General phenomena—Time, 3 to 5 days usually. Temperature range 102° to 104°, pulse range 100 to 110, usually. Chilliness, pain, lochia usually foul, amount not decreased.

Perimetritis

Def.—Inflammation of peritoneum covering uterus, but usually broadened to include pelvic peritoneum.

Etiology—(1) Ascending gonorrhoea. (2) Strepto and staph of low virulence, since virulent organisms would not localize on pelvic peritoneum, but would involve the general peritoneum.

Pathology—An exudate with little tendency to localize. Adhesions with intestinal paresis of low grade and abdominal distention. Tenderness most marked in lower abdominal quadrants. High temperature and pulse.

Phlegmasia Alba Dolens

Syn.—Milk leg.

Etiology—USUAL FORM a thrombosis of femoral, saphenous, crural or popliteal veins, usually an extension from a periuterine phlebitis. **Rare form** an extension of a parametritis through the lymphatics to the tissues surrounding the great vessels of the thigh. I believe that this is always an infection.

Clinical picture—Usually appears during second or third week of puerperium, frequently in previously afebrile cases. The patient may be up and about her household duties. The attack is usually ushered in with a chilly sensation and a temperature range of 100° to 101°. There is usually pain in the groin. THE LEFT SIDE IS USUALLY AFFECTED. There is frequently a sense of weight and stiffness in the calf.

In the cellulitic form the symptoms are similar, but there is history of pelvic cellulitis, and the swelling begins above and extends downward.

Examination—The foot, leg and thigh become swollen in the order given, look whitish, perhaps mottled in places, and the skin feels tense. Palpitation will usually reveal the hardened, cordlike femoral vein, extremely tender, the course of which is often marked by the reddened skin over it.

Course of disease—The temperature usually comes down to normal in two or three weeks, but the swelling may persist from six weeks to three months. The patient may be annoyed for a year or longer by swelling of the affected limb on standing or walking.

Prognosis—Usually good, but convalescence often tedious and the patient incapacitated for a long time. Never lose sight of the great danger, pulmonary embolism.

Treatment—(1) Absolute rest in bed until the temperature has remained normal for 4 days. (2) Elevation of the affected limb accomplished by well padded posterior splint, with the foot elevated about 12 inches. (3) Ice bags over groin and on affected vessels. (4) In our local service we have obtained good results by bandagnig limb thickly and loosely, using a large amount of gauze padding, which is kept saturated with a saturated solution of magnesium sulphate. A wet bed is prevented by covering with impermeable dressings. (5) Keep bowels open with routine cathartic. (6) Do not massage on account of danger of embolism. (7) For pain use heroin, 1/12 to 1/24 grain p. r. n. (8) Before patient arises bandage limb with flannel bandage cut on bias. Bender's Ideal Bandage meets all requirements. Patient should be instructed in its application, and should not be in upright position without the bandage for at least one year. These bandages can be washed.

Toxinemia

Etiology—This is a synonym for the old term sapremia in which saphrophites only were supposed to be the nfecting organisms. Toxinemia is a broader term embracing all types of organisms, since we usually have a mixed infection. The absorption of toxins, which circulate in the blood, causes the symptoms.

Local phenomena—Cannot distinguish from puerperal endometritis. Increased, foul lochia, with clots and repeated hemorrhages, are pathognomonic. Uterus large, boggy, subinvoluted, tender.

General phenomena—Temperature and pulse elevated, general symptoms vary with degree of toxemia.

Bacteremia

Syn.—Septicaemia.

Def.—An acute infectious disease due to the entrance into the blood of bacteria and their toxins.

Etiology—Usually strepto, staph, pneumo and gonococci.

Varieties—From standpoint of atrium of infections:—

Lymphatic type follows an endometritis, the bacteria passing along the lymph spaces of the uterus and broad ligaments into the blood.

Vascular type begins as a metrophlebitis, with thrombosis of the veins, usually at the placental site. From this the bacteria gain direct entrance into the general circulation. PYEMIA results from the vascular type, if at all.

Pathology—(1) The lesion may be insignificant, since the severity of the disease depends upon organisms of high virulence. (2) Autopsy findings in lymphatic type: endometritis gangrenosa, the whole tract being covered with a greyish, sloughing exudate. Parametritis and lymphangitis, the lymphatics being filled with purulent fluid, and the connective tissue being infiltrated and edematous. Peritonitis, either pelvic or general. Pleuritis, pericarditis, swollen spleen, fatty degeneration of muscles, cloudy swelling of heart, liver and kidneys. (3) Autopsy findings in the vascular type: Lymphatics not involved. The veins of the placental site are filled with thrombi, bacteria have eroded the vessel walls with resulting deposit of fibrin, occlusion of the lumen of the vessel and extension of the process into the venus plexuses of the broad ligament.

Local phenomena—Usually not present; since in a bacteremia the local reaction has failed, else the bacteria would have been destroyed before they reached the blood stream.

General phenomena—Incubation period 1 to 3 days. The prodomal stage is characterized by the signs and symptoms of the local process from which bacteria gained access to the blood. Usually ushered in by a severe chill lasting from 5 to 30 minutes. During the rigor the skin is pale and moist, lips are cyanotic. Temperature range 103° to 106°, pulse 120 to 160, the latter being soft and compressible on account of the action of the toxins in weakening the heart muscle. On account of the destruction of the red blood cells by the toxins, there is deficient oxygenation of blood, with pallor or cyanosis and high respiration. Tympany, malaise, headache, insomnia, delirium, and signs of

peritonitis, such as nausea, vomiting, pain, facies Hippocratica. Lochia profuse on account of the endometritis gangrenosa, but odor not marked. Puerperal wounds necrotic.

Duration—Two to ten days.

Prognosis—Nearly always fatal.

Pyemia

Def.—A type of bacteremia in which bacteria enter circulation in infected emboli originating from an infected thromboplebitis of pelvic vessels.

Pathology—Thrombosis of pelvic veins, beginning at the placental site. This thrombosis may be limited to a small area and be entirely within the uterine wall, or may extend beyond the uterus and occasionally involve all the pelvic vessels as far up as the junction of the renal veins with the inferior vena cava. By the breaking down of these thrombi, we have emboli escaping into the general circulation, with septic endocarditis and metastatic abscesses. No portion of the body is exempt, hence eye, brain, cord, joints, valves of heart may become involved.

RECAPITULATION OF THE SYMPTOMS OF PUERPERAL INFECTION

Temperature—The predominant symptom is temperature occurring on the third to the fifth day postpartum.

Variations—Temperature may rise immediately after delivery, and remain high until death or through a tedious convalescence.

Type—Higher in the evening than the morning, and takes three to five days to reach highest point. In pyemia the rises and falls of temperature very sudden and pronounced, a normal temperature, a rigor and a temperature of 105, occurring within a space of two or three hours.

What constitutes fever? Two daily rises to or above 100.5° F. considered as a sign of infection. No such thing as milk fever. Puerperium should be afebrile.

Rigors—Slight shivering at outset of mild cases. Definite rigors at onset of bacteremia, with initial rise of temperature. Repeated rigors are characteristic of pyemia.

Pulse Rate—In toxinemias the pulse rate is apt to be slow, usually 100 or below. In a bacteremia pulse usually 120-140 for weeks, if patient recovers.

Uterus:

Subinvolution—Marked in toxinemia, due to deficient contraction on account of retained placental fragments, blood clots, etc. Involution may be normal in severe septicemia.

Tenderness—Usually absent in severe septicemia, but marked in toxinemia, parametritis, perimetritis, etc.

Lochia—Usually foul and abundant in a toxinemia with retained products, scanty or absent, often without odor, in a bacteremia.

Abdomen—The condition of the abdomen in a bacteremia depends upon whether the infection has spread to the peritoneum by the lymphatics, or not. If the peritoneum is not involved, the abdomen may be soft, not distended and not very tender. If the peritoneum is involved it may be localized as a pelvic peritonitis. On the other hand, the peritonitis may be general, with tense, distended abdomen, vomiting, rapid pulse and evidences of great depression.

Gastro-Intestinal:

Diarrhoea may be present, particularly in severe types.

Vomiting is rare unless the peritoneum is involved.

Anorexia is present in all types.

Pain—The amount of pain varies greatly in the various types. Usually greatest in a localized process such as parametritis. In the severest bacteremias frequently there is no pain.

Other Symptoms—Headache, insomnia, furred tongue, sweating, foul breath.

DIAGNOSIS

If a woman has an elevation of temperature after delivery, always suspect puerperal infection but do not fail to remember that any disease or complication characterized by an elevation of temperature, may occur during the puerperium.

Routine Procedure

History—A delivery, normal or operative; the patient does well for two or three days; there is a chill, followed by a rise intemperature. Consider carefully:—constipation, method of delivery, method of conducting third stage, lacerations and their care, asepsis of the nurse, asepsis of the medical attendant, nervous condition of the patient (emotional temperature), and the various conditions, aside from puerperal infection, which are characterized by fever.

Examination—Make a careful physical examination of every case, including the throat, heart, lungs, breasts, abdomen, contraction of the uterus, heighth of the fundus (involution), extremities (Phlegmasia), vulva (infected sutures), local points of pain and tenderness. **Repeat this examination frequently.**

Laboratory Examination—Bacteriological examination of the lochia and of the blood is of little or no practical value, since vaginal and cervical cultures are likely to be contaminated, or to be negative, and blood cultures even if characteristic, will not aid the physician in treatment. The white blood count is sometimes of value in the differential diagnosis. Examination of the blood smear for malarial parasites is important in undiagnosed cases. The Widal reaction may aid in the differentiation between puerperal infection and typhoid fever. Urinalysis is of absolutely no value unless the specimen is catheterized, on account of contamination by the lochia.

Differential Diagnosis—Always consider the following possibilities:

Constipation—A history of constipation does not rule out puerperal infection. Constipation will, some authors to the contrary notwithstanding, cause a rise of temperature. A thorough cleaning out of the gastro-intestinal tract should clear up the diagnosis.

Mastitis—There is no such entity as "milk fever," but we cannot overlook the fact that in certain cases, particularly nervous primiparae with sensitive breasts and nipples, the first engorgement of the breasts is frequently accompanied by a slight rise of temperature, even up to, but not above, 101. This promptly subsides with the application of a breast binder, ice-bags, and the restriction of liquids. In over 90% of such cases, the temperature is due to the low grade breast infection, but in the remaining 10% it may be ascribed to emotional causes. Sensitive, painful, engorged breasts, containing lumps (engorged or infected lobules), particularly when associated with eroded or fissured nipples, in nearly every instance indicate a mastitis.

Pneumonia—This is a relatively common complication of the puerperium. The physical signs of a pneumonia are present.

Tonsillitis—Infected tonsils, with or without sore throat.

Infection of the nasal passages—The history of a cold, with signs of infection of the nose.

Acute pulmonary tuberculosis—An old tubercular lesion frequently becomes active after delivery. A careful examination of the lungs, with laboratory examination of the sputum, should clear up the diagnosis. Observation of the patient over a considerable period may be necessary, in order to confirm the diagnosis.
Pyelitis—Pain and tenderness in the region of the kidney, elevation of temperature, irritable bladder, catheterized specimen of urine, acid in reaction, and containing pus.

Malaria—The history of having lived in a "malarial country" or having had malaria; discovery of the parasite; regularity of the rigor and rise of temperature.
Typhoid—Observation; leucopenia; Widal reaction; history; course of the disease.
Appendicitis—History and findings. This condition is frequently simulated by puerperal sepsis.

Is There Anything in the Uterus?

History of labor, especially third stage; history of excessive hemorrhage; uterus larger than normal for the period of the puerperium. **If you are not positive, or if the patient has a temperature, or if the case is seen later than 24 hours after the beginning of the present illness, treat the case as though there were nothing in the uterus.**

Summary—To make an absolute diagnosis of puerperal sepsis often requires extended observation. Days or weeks may elapse before the diagnosis is clear. **Our chief aims are to eliminate non-puerperal infections, and to so treat the patient that her protective processes will not be interfered with. The diagnosis of the exact type of puerperal sepsis is not important, since the treatment of all forms of puerperal sepsis, excepting phlegmasia alba dolens, is the same in the early stages.**
If unable to assign the temperature to a definite, non-puerperal cause, treat the case as one of puerperal sepsis.

PROGNOSIS

Toxinemia—Good as to life. Sub-involution is common.
Bacteremia—With rapid and severe onset, almost hopeless. If the onset is slower, and the case of the chronic type, there is a fair chance for recovery, but invalidism is prolonged.

Parametritis—Recovery is prolonged, but almost certain, if the case is treated conservatively.

Perimetritis—Good, so long as the involvement remains local. If the condition becomes a general peritonitis, the prognosis is nearly always fatal.

Summary—Be guarded in the prognosis, regardless of the type.

TREATMENT OF PUERPERAL SEPSIS

Prophylaxis

Pre-existing infections should be recognized by history and examination of smears. Vulvitis, vaginitis, and Bartholinitis to be cured before delivery. Suppuration in any part of the body treated and cured. Vaccines.

Prevent infection in latter part of pregnancy... Coitus in last month very dangerous from standpoint of infection. Tub baths, douches, self examination, also contra indicated.

Specific immunization by the use of mixed vaccines during the last six weeks of pregnancy is a new field.

Rubber gloves to be worn in all examinations, both antepartum and intra partum. In Sloane Hospital for Women the percentage of infections has been reduced over one-half since the introduction of gloves.

Vaginal examinations reduced in number to a minimum and made very gently. Seldom if ever necessary to make more than two examinations during labor, and very often may conduct a labor without a single examination. Rigid asepsis at each examination.

Avoid measures to shorten time of labors SUCH AS artificial rupture of membranes before complete dilatation, manual dilatation of cervix and perineum, application of forceps without scientific indication, etc.

Prevent lacerations by careful control of the head, by doing no operative work without indications, and by the use of an anaesthetic in every case.

Scientific treatment of the third stage. Control of fundus, no expression of placenta until separated, except for hemorrhage, manual extraction of placenta only as a last resort (mortality from infection 10%). Use no ergot until after placenta has been delivered, intact. Care in examination of the placenta for missing cotyledons.

Repair all lacerations, however small.

Avoid douches.

Rigid asepsis during puerperium.

Curative

Principles: It is well established that nature, with her leucocytes and tissue resistance, i. e., Protective Zone, is usually able to limit and overcome the invasion of infecting organisms.

It is equally well established that misguided efforts, by curettage and other surgical procedures to rid the parturient canal of its infection, **always** break down nature's barriers and convert a local process into a general infection.

Hence every effort should be made in aiding nature in her resistance to the infecting bacteria, and every care should be taken not to handicap her by lowering the resistance of the tissues or opening up new avenues for infection.

Local Treatment:

1. **Douches** are never indicated during the active period of an infection.
   Why? a. Inefficient, bacteria buried in tissues 15 min. after innoculation.
   b. Infection may be carried higher in birth canal.
   c. Perforation of uterus.
   d. Antiseptics lower tissue resistance.
   e. Clinical proof; they do no good.
2. **Stitches** should be inspected, and removed **only** if infected.
3. **Digital** or **instrumental examinations** should not be made during acute process, on account of causing new injuries to tissues, or breaking up some walled up process. (See discussion of retained secundines.)
4. **Removal of Retained secundines:** There is only one time when retained secundines can be removed with relative safety, and that is at completion of third stage. Ovum forceps and curette extremely bad. Remove retained secundines only with hemorrhage as an indication, during the acute process. In this instance they are removed digitally, with as little trauma as possible. If case is seen at beginning of infection, and there is an **absolute history** showing that a large amount of placental tissue has been retained, removal is occasionally justified. If not positive that there are retained secundines, it is always safer to treat the cases as though there was nothing in the uterus. It is never safe to enter the uterus for the removal of retained secundines in the presence of an elevation of temperature.

5. **Puerperal ulcers** may be painted daily with Tr. Iodine, but will heal as readily if simply kept clean.

GENERAL TREATMENT

Routine Procedure

1. **Fowler position** to facilitate drainage, and to limit absorption, since there is less absorption from the pelvic peritoneum than from the peritoneum of the upper abdomen.
2. **Ice bags covering lower abdomen** are used for the relief of pain. The ice bag also does good by causing firm contraction of the uterus (reflex).
3. **Protocleisis** is started, using plain tap water, dropping at the rate of 30 drops per minute. This is given continuously for from three to five days. If not retained, we may interrupt, discontinuing for two or three hours at a time, or we may substitute the interrupted method of placing six ounces of solution in the rectum every four hours. This is given for stimulation, and to promote elimination.
4. **Fluid extract of ergot** is given in ½ dram doses three or four times a day, to promote uterine contraction and hence to limit absorption. If the patient is unable to retain the ergot, extract of the pituitary body is given by hypo, usually 1 cc. three times a day.
5. **Diet:** A full light diet, giving food at frequent intervals. Egg nogs with brandy may be given several times a day.
6. **Fresh air** is an essential factor in the treatment of puerperal sepsis. The windows should not be closed, either by day or by night. If possible the patient should be kept on an open porch.
7. **Antipyretic drugs** should never be given.
8. **Stimulation** is given by the drop method, and the use of drugs is rarely necessary. Caffeine and sodium benzoate, 1 grain of the combined drug by hypodermic every 2½ to 3 hours, or Digalen, 8 minims by hypo every 3 hours, have given me the best results.
9. **Specific therapy** through the use of serums or vaccines does not give good results.

Special Treatment

Surgical treatment is indicated only where a diagnosis of a localized collection of pus has been made. A pelvic abscess should not be opened until 6 to 10 weeks after

the beginning of the infection, and then only if the abscess can be palpated with ease 6 to 10 cm. above Pouparts ligament. A pelvic abscess should not be opened vaginally unless there is very pronounced bulging into the vagina. It is always safer to wait until this occurs, and open it abdominally.

Peritonitis may be treated surgically, but results are uniformly bad.

Parametritis may be treated by prolonged hot douches, after the acute process has subsided. The object of the douches is to promote the absorption of the exudate.

Pain in puerperal sepsis seldom requires the use of opiates. Except in perimetritis, where it is occasionally indicated, morphine should not be used, on account of its tendency toward locking up secretions, and toward intestinal paresis. Bromides, with or without codeine, give good results.

Intestinal paresis frequently responds to peristaltine, given in 1 cc. doses, by hypo, every 8 to 12 hours.

CHAPTER 12

Diseases of the Breasts

ENGORGEMENT

Def.—This is a simple exaggeration of the distention which normally occurs with the establishment of the milk secretion on the third or fourth day.

Syn.—The form of engorgement in which a localized swelling is noted, is known to the laity as "caked breast."

Etio.—Too rapid formation of milk, deficient emptying of breasts, or obstruction of the lacteal ducts to the outflow of milk. It is most common in primiparae and women with pendulous breasts.

Symptoms—Breasts are tender, very large, shiny, tense, and feel very warm to the touch. The axillary glands are frequently enlarged. Large blue veins are seen just beneath the skin. In the so-called caked breast there is a localized, knotty swelling of the glandular tissue. There is never a temperature of over 100.5° in an engorgement not associated with infection.

Diagnosis—In every case suspect a beginning mastitis and treat as such. Mastitis cannot be ruled out at once.

Treatment—(1) Support the breasts with a firm breast binder. (2) Apply ice bags to both breasts continuously. (3) Allow the baby to nurse regularly. (4) Re-

strict the liquids in the patient's diet. (5) Obtain free catharsis with salines. Saturated solution of magnesium sulphate, 2 drams three or four times a day, will give good results. (6) Do not advise massage, because we may spread infection if present, and because massage will increase the flow of milk. (7) Do not empty the breast with the breast pump, because this also will stimulate the flow of milk.

MASTITIS

Def.—Inflammation of the mammary gland.

Predisposing Causes—Fissures and erosians of the nipple, particularly in deformed nipples. Traumatism, especially as the result of bruising the breast by injury, by massage or by the use of the breast pump.

Exciting Causes—Any of the pathogenic bacteria.

Time of Occurrence—Usually during the second week, but may occur at any time during lactation.

Types—The two most important types are the **parenchymatous**, in which the glandular tissue is involved, and the **intestitial**, in which the infection spreads along the connective tissue. In the parenchymatous type the infection is carried along the milk ducts, while in the interstitial the transmission is by means of the lymphatics.

Symptoms—Locally the breast is enlarged, painful, extremely tender, and there is usually a reddened area in one of its lower quadrants. This area is hard and knotty, later becoming softer, with shiny skin, and fluctuation, as suppuration takes place. If the deep lymphatics are involved, the case resembles one of deep cellulitis of any part of the body, and gives the brawny feeling characteristic of that condition.

General—The condition is usually ushered in with a chill, or a chilly sensation, and a temperature of from 102 to 105 degrees. The pulse varies between 100 and 120. The temperature is continuous for two or three days, and then becomes remittent. The patient feels very ill. Anorexia, malaise, headache, and constipation are usually present. The acute symptoms subside gradually after rupture of the abscess, or rapidly when the abscess is opened and drained.

Terminations—A mastitis may clear up without suppuration. If suppuration occurs, and treatment is not instituted at once, successive lobes are rapidly involved until the whole breast becomes riddled with abscesses.

Untreated cases usually rupture only after extensive involvement has taken place.

Diagnosis—During the entire period of lactation, breast infections should always be considered in assigning a cause for pain or an elevation of temperature. The signs and symptoms may not be characteristic, when the case is first seen, but observation will clear up the diagnosis in a few hours. **Suppuration** is very difficult to diagnose in its early stages. The author advises the use of the all glass hypodermic syringe as a diagnostic agent when in doubt. The breast is painted with 2% Tr. Iodine, and properly draped with sterile towels. A sterile Luer syringe, with a 20 gauge needle, is plunged into the site of the suspected abscess, the needle entering at right angles to the skin. Withdrawal of the piston will result in the aspiration of pus, if present. Absolute asepsis is essential in this procedure.

Prophylaxis—During pregnancy, keep breasts well supported with bust supporter or brassiere. Prevent uneven pressure upon nipples or breasts. During the last month the breasts should be washed with warm soap suds each day, and nipples should be anointed with albolene or white vaseline once or twice each day. No astringents, alcohol, boric acid or tannic acid should be used. Warn patients against the use of "Mother's Friend."

During lactation the breasts should always be well supported in breast binder. They should be washed each day with soap and water, and nipples washed before and after nursing with boric acid solution, saturated. Inspect daily for fissures and erosions, and treat promptly. A FISSURE OR EROSION OF THE NIPPLE IS ALWAYS THE POINT OF ENTRANCE IN A BREAST INFECTION, Keep nipple surgically clean. Protect from contamination with sterile pledget.

Active Treatment

Diet—Dry diet, carefully restricting liquids.

Bowels—Give saturated solution of Epsom salts, two or three drams, t. i. d.

Ice Bags applied to both breasts continuously.

Pain is usually controlled by ice bags, but may require the use of codeine, gr. ½ q. 3 h.

Nursing the Baby is not advisable if the temperature remains above 101.

When fluctuation is seen open the abscess at once,

under general anaesthesia. Make at least two radial incisions, each sufficient in length to permit careful digital exploration and free drainage. Usually 1½ to 2 inches are required. Drain abscess after carefully breaking up all pockets with finger, using ¼-inch rubber hose as drain. Hose should be perforated or cut longitudinally, and should run through breast from one incision to the other. Retain in place with safety pins. Dress daily.

After abscess is opened allow baby to nurse the non-infected breast.

EROSIONS OF THE NIPPLE

Def.—An abrasion of the surface, often hardly visible to to the naked eye, but extremely sensitive.

Time—Usually during the first week of lactation.

Diagnosis—By inspection, we notice a tiny red spot, extremely sensitive to pressure. The epithelium has been removed and the scarlet papillary surface beneath givs it the characteristic appearance. It causes extreme pain during the act of nursing.

Prophylaxis—See discussion under mastitis.

Treatment—(1) Have nurse apply thin coat of Tr. benzoin comp. with camel's hair brush after each nursing, and wash off with boric solution before next nursing. (2) Silver nitrate solution, 5% may be used once daily, **by the doctor.** It should not be used by nurse. (3) If the erosion does not clear up within 24 hours, or if the pain is extreme, advise the use of a nipple shield. Dr. Conover's Nipple Shield is the best. This should be discontinued as soon as the erosion is healed.

FISSURES OF THE NIPPLE

Def.—Differs from an erosion in the fact that the lesion is not confined to the mucous membrane, but extends deeply between the papillae. The nipple seems to have cracked open, and sometimes bleeds freely.

Treatment—Silver nitrate, in the form of lunar caustic, is used to touch up the fissure throughout its entire extent. Repeat daily. Always use the nipple shield until fissure is completely healed.

SECTION IV

Introduction to Operative Obstetrics

CHAPTER 13

Preparations Before Operation

Importance—Haste makes waste. Obstetric operations have the same mortality as similar operations in general surgery. What surgeon would remove an appendix without preparation, and yet how often do physicians attempt a high forceps operation, with twice the mortality, and with no equipment or preparation provided? Good results cannot be obtained without proper preparation.

Where Done—The hospital is desirable in serious cases when hospital facilities are available and the transfer of the patient is advisable. Commercial reasons should not deter the attendant from transferring his patient to a hospital when he feels that the case requires hospital care.

Home Preparation—(1) **Room.** The room selected should be well lighted, either naturally or artificially. Loose floor coverings should be removed, and the floor covered with clean newspapers, in order to avoid damage to property. All superfluous furniture should be removed. (2) **Operating Table.** Under no circumstances should even the minor obstetric operations be attempted until the patient is placed upon an improvised table. The kitchen table, covered with a comforter and sterile sheet, will prove satisfactory. The Kelly pad is placed at the foot of the table, and a jar or bucket placed beneath the sleeve of the pad to catch the drainage. (3) **Sterile Water.** Hot and cold sterile water must be provided. (4) **Instrument Table.** A small table is placed on the operator's right, for instruments and solutions. (5) **Leg Holders.** Kelly's leg holder, or a modification, consists of a canvas strap which may be passed over one shoulder and behind the other, the ends of the strap passing around either thigh, and maintaining the patient in the dorsal lithotomy position. A satisfactory substitute consists

of a sheet, folded diagonally, and used in the same manner. (6) **Solution basins** must be provided. Three or four milk basins, sterilized by boiling, will answer the purpose.

Patient's Preparation—(1) **Shave** after placing on table. (2) **Enema** should not be given within two hours preceding operation, on account of the danger of soiling the field with liquid feces. (3) **Scrubbing** should be done on the table, after the patient is under the anaesthetic.

Physician's Equipment—The minimum outfit required for operative obstetrics is as follows:

1 Pelvimeter (Collier's Improved)*
1 Forceps (De Lee or Tarnier)*
1 Needle holder (Mayo)*
4 Allis forceps
6 Ochsner forceps
1 Mayo scissors
2 Tissue forceps (mouse tooth)*
8 Assorted needles
1 Uterine packing forceps (De Lee)*
2 Vulsellum forceps
2 Sponge forceps (ring type)
1 Colpeurynter set (Voorhees' bags and six-ounce Matchless metal syringe)
1 Hypodermic syringe (Sherman)*
1 Ether mask (folding)*
1 Soft rubber catheter (No. 18 Fr.)*
2 Scrub brushes
12 Tubes chromic catgut (No. 1 and 2)*
1 Package silkworm gut
500 grams ether
3 Ampoules silver nitrate
3 Ampoules Pituitary extract
3 Ampoules aseptic ergot
4 Pairs rubber gloves
Liquor cresolis comp.
Alcohol
Fluid extract of ergot
Sterile gown, towels, cotton pledgets, gauze sponges, cord dressings, tape for umbilical cord.

*Recommended.

In addition to this equipment a craniotomy set is essential if the physician is so located that craniotomy instruments would not otherwise be available.

Anaesthetic—Ether is the anaesthetic of choice. Surgical anaesthesia is essential in all obstetric operations excepting the induction of labor, and certain minor operations such as the rupture of the membrances, Kristellar's expression, etc. While it is occasionally possible to dispense with an anaesthetic, this is never advisable and will result in uniformly poor results. Nitrous oxide-oxygen anaesthesia gives satisfactory results where complete relaxation is not essential. It should never be used in a version. A trained anaesthetist should always be obtained if possible. The pernicious practice of allowing the husband or other relative to give the anaesthetic is not conducive to scientific obstetrics.

CHAPTER 14

Classification of Obstetrical Operations

Preparatory Operations

1. Induction of labor and abortion.
2. Dilating: Cervix, vagina, vulva, pelvis, colpohysterotomy.
3. Improving position and attitude: Turning, changing position, replacing parts.

Delivery

1. Expression, Kristellar, Hofmeier, Ritgen.
2. Forceps: Low, mid, high.
3. Extraction: Breech, version.
4. Celiohysterotomy: Classical, Porro.
5. Embryotomy: Perforation, cranioclasis, decapitation.

Third Stage

1. Manual extraction of placenta.

Reparatory

1. Cervix.
2. Vagina.
3. Perineum.

Accessory

1. Intrauterine douche.
2. Uterine tamponnade.
3. Vaginal tamponnade (Dublin pack).
4. Hypodermocleisis.

SECTION V

Preparatory Operations

CHAPTER 15

Induction of Abortion

Utero-gestation is interrupted artificially when its continuance is detrimental or dangerous to either mother or child. If such danger arises or is present before the twenty-eighth week of gestation, only the condition of the mother is taken into account, as all the children are lost. From this period until maturity the interests of both mother and child are considered. Interruption during the earlier period is called abortion, and during the later period, premature labor.

Indications—

Class 1—Diseases which directly and immediately threaten the mother's life, and which can be cured only by therapeutic abortion.

Hyperemesis Gravidarum—If in spite of active treatment there is a steady loss of weight, increase in pulse rate, decrease in quantity of urine, rising ammonia nitrogen, abortion should be performed at once. If not performed promptly, the mother will die in spite of the operation.

Acute Hydramnios—In the third to the sixth month cardiac insufficiency, with pressure symptoms, dyspnoea and cyanosis, may indicate abortion.

Hydatidiform mole—Abortion always indicated as soon as diagnosis is made.

Incarcerated retroflexed gravid uterus—Generally subjective symptoms will call attention to the condition, when reposition is still possible. Spontaneous replacement occurs occasionally. If adhesions are maintaining the uterus in its retroflexed position, laparotomy will give excellent results. Abortion indicated if replacement is impossible, and laparotomy refused or contraindicated.

Uterine hemorrhage—A hemorrhage persisting for weeks, with or without clots, or of sufficient quantity

to result in elevation of pulse rate, is an indication for abortion.

Infected uterine contents—This is a legal indication, but our modern ideas of the treatment of puereral sepsis do not allow us to empty these uteri except under extraordinary circumstances.

Class II—Diseases which do not directly threaten the mother's life at the time, but which, if allowed to continue, may seriously compromise her safety later in pregnancy or during labor.

Acute and chronic nephritis—In the acute form, immediate abortion is necessary in order to save the patient's life. In the chronic form, an increasing albuminurea, the presence of casts, edema, etc., should indicate abortion.

Cardiac Insufficiency—Cardiac disease is in itself not an indication for abortion. Failing compensation, shown by cyanosis, dyspnoea, rapid and irregular pulse, and effusions into the serous cavities, will indicate abortion.

Tuberculosis of lungs and larynx—Tuberculosis makes little progress during pregnancy, but is rapidly fatal afterwards. Early cases of tuberculosis, and old cases which are becoming activated during pregnancy, should be aborted and sterilized. Advanced cases cannot be helped by abortion. Cases seen late in pregnancy cannot be helped, and it is best not to interfere after the fourth month.

Chorea.

Pernicious anemia.

Psychoses.

Class III—Physical conditions rendering labor by the natural passages impossible, and where the patient refuses Caesarian section at full term.

Abortion may be induced in women with deformed pelves when the conjugata vera or bi-ischiatic diameter measures 7 centimeters or less. Irreplaceable or fixed tumors in the true pelvis which may interfere with delivery, may indicate abortion. Many of these tumors can, however, be removed by surgical methods during gestation. I do not recommend abortion in this type of cases, since elective Caesarian section is as safe as the induction of abortion, saves the child, and furnishes the opportunity for sterilization if future pregnancies are to be prevented.

Legal Protection in Therapeutic Abortion—Certain procedures are necessary in order to protect the legitimate physician from the blackmailer and the quack. A consultant should always be called in a case involving the induction of abortion. A file should be carefully prepared and should contain: (1) History of case. (2) Physical findings of attending physician. (3) Indications for abortion, recognized by attending physician. (4) Statement of consultant, giving date of consultation, name and address of consultant, brief history, with physical findings and recommendations of the consultant, and signed by him. (5) Consent to operation by patient and nearest relative, stating the nature of the operation and the reason for its performance.

The abortion should be performed in a hospital if possible, and always in the presence of witnesses. Avoid secrecy. Show file to superintendent of hospital, and keep under lock and key for several years.

Sterilization—The author makes it a rule in many of the chronic conditions in which an abortion is indicated, such as tuberculosis, chorea, certain kidney conditions and certain psychoses, to recommend a sterilization at the time the abortion is performed. Unless this is done the patient frequently becomes pregnant within a short time, and the whole process has to be repeated. I do not believe that any good can possibly come from therapeutic abortions, if they are frequently repeated. If sterilization is performed, on the other hand, the fear of pregnancy is removed, the danger of repeated abortions is obviated, and the patient will usually be left in better condition than ever before.

Methods—(1) Induction of abortion during the first two months. The patient having been surgically prepared, the cervix is brought down to the outlet with vulsellum forceps, dilated with graduated sounds, and the products of conception removed with a sharp curette or an ovum forceps. Extreme care should be used in order to avoid perforation of the uterus with the curette. No packs or local applications are necessary or advisable.

(2) Induction of abortion after the second month. If the cervix is soft and dilatable, dilation with graduated sounds under anaesthesia, followed by the digital removal of secundines, is advisable. The use of the ovum forceps or sponge holder (ring type) is per-

missable, but the curette should not be used at this period of pregnancy, on account of the extreme danger of perforation.

If the cervix is rigid, and non-dilatable, it is advisable to precede the emptying of the uterus by the artificial rupture of the membranes with a small ovum forceps, followed by the placing of a ten yard plain gauze pack in the lower uterine segment and cervix. The width of this pack should be ½ inch. Nu-gauze strips make an excellent pack. The patient should then receive Pituitary Extract, ½ cc., or Flx. Ergot, ½ dram, every three hours. The pack is removed in 24 hours and after dilatation, the secundines are removed digitally as outlined.

(3) **Abortion and sterilization.** The patient is prepared for laparotomy, anaesthetized, and a short incision made through the right rectus, just above the symphysis. The uterus is drawn up to the abdominal wall, usually with a vulsellum forceps, and a short (one or one and one-half inch) incision made in the anterior mid line, extending into the uterine cavity. Through the opening thus made the products of conception can be digitally removed, with ease. The uterus is closed with interrupted sutures of No. 2 chromic catgut. One inch of the uterine end of each tube is then resected, the peritoneum whipped over the raw surfaces, and the abdomen closed. The advantages of this procedure are: (1) Short anaesthesia required, (2) Extremely small amount of blood lost, (3) Very slight danger of infection, since absolutely no vaginal work is done, and the field is surgically clean.

CHAPTER 16

Induction of Premature Labor

Indications—(1) Pelvic contraction having as its lowest limit a C. V. of 7 to 8 Cm. Below 7 Cm. the fetal mortality is so great that the operation is useless. With the development of the modern Caesarian section, the induction of premature labor as a method of treating contracted pelves has been discarded, since the fetal mortality during labor and the first few months of extrauterine life is very high, and the maternal mortality is nearly the same. If the opera-

tion is done, it should be performed at about the thirty-fifth week.

(2) Conditions Dependent upon Pregnancy, which Threaten the Mother's Life—Vomiting of pregnancy, eclampsia, placenta previa, etc.

(3) Conditions Independent of Pregnancy Which Threaten the Mother's Life—Chronic nephritis, diabetes, exopthalmic goitre, cardiac disease when compensation is breaking, etc.

(4) Habitual death of the fetus before term and after viability. If the cause is syphilis, as shown by necropsies on the children in former pregnancies, and by the Wasserman reaction, active antisyphilitic treatment will give excellent results. In cases of unknown etiology, or in those in which efficient treatment has not been carried out, the induction of premature labor a little prior to the time at which the fetus has died in previous pregnancies, is distinctly indicated.

Methods—(1) Metreurynter (syn. colpeurynter). This will be the method of choice in practically every case. The technique will be discussed under "Dilating Operations."

(2) Bougie Method (known as Krause method). This method is applicable to cases in which the element of time is not important. The period of treatment may last from one to three days. Technique: The patient is surgically prepared and without anaesthesia, one or more (preferably two) bougies are passed between the membranes and the uterine wall. The bougies should be from 5 to 9 mm. in diameter (8 to 16 English) and from 33 to 35 cm. in length. The bougies are immersed in a strong solution of lysol for one hour and rinsed in sterile water. Boiling will ruin a bougie. The bougies may be introduced by sight, after drawing down the cervix with tenacula, but it is usually best to introduce one or two fingers into the cervix and guide the bougie as it passes into the uterus. If resistance is encountered the bougie is withdrawn and reintroduced in another direction. Light vaginal tamponnade is advisable, in order to prevent the extrusion of the bougie before the onset of good labor pains. If no pains occur in from 12 to 24 hours, or if the contractions are weak, an additional bougie is passed. If efficient contractions do not result after 48 hours, the method should be discarded. **Dangers:** Perforation of the uterine wall, premature rupture of

the membranes, premature separation of the placenta, introduction of bacteria high up in uterus, etc. This is an inefficient and very unsatisfactory method and should not be chosen except in very rare instances. For example, in a multipara, with three or four fingers dilatation, the introduction of a bag would be almost impossible, and the bougie might have to be used.

(3) Artificial Rupture of the Membranes (Scheele method). This produces the condition known as a dry labor, but nevertheless has a restricted field in the induction of labor in multiparae, where the opportunity for more satisfactory work is lacking. As a rule, the contractions begin in from 2 to 12 hours after rupture of the membranes, the labor being terminated in from 12 to 24 hours. This method should not be used in a primipara except in hydramnios.

Regardless of the method used, when uterine contractions have been inaugurated, the patient is to be treated as in labor at term.

The question as to the advisability of inducing premature labor depends upon the judgment and experience of the attendant. When we remember that in all contracted pelves we may expect 80% of the children to pass through spontaneously at full term, the problem of the induction of labor for this indication becomes intricate. In conditions which threaten the mother's life, on the other hand, the author believes that prompt and efficient induction of labor will give better results than the expetcant treatment.

CHAPTER 17

Dilating Operations

DILATATION OF CERVIX

Object—(1) Induction of labor. (2) To hasten labor in the presence of a definite indication. (3) As a preliminary step in the operations of delivery. Thus an important condition in the operation of forceps or version is "Complete dilatation of the Cervix."

(1) Manual Dilatation

The human hand is the safest and most effective instrument in our obstetric equipment. As a means of effecting rapid cervical dilatation, it admits of no super-

ior method. The amount of energy required in this operation is remarkable, and often demands the last reserve of our physical powers. Manual dilatation may be effected with one or both hands.

The Unimanual Method (Harris' method) is preferred in primiparous women whose cervices lie high in the pelvis. It is claimed that it is possible to dilate the cervix to a circumference of 10 to 12 inches in about 45 minutes, provided it is possible to insert the first finger through the cervix to the metacarpo-phalangeal joint. The chief danger, laceration, arises from rapid and too forcible dilatation. **Technique—Unimanual Method:** The patient is surgically prepared, and placed under deep anaesthesia. The perineum is dilated to admit the entire hand. If the cervix is not effaced or dilated, a preliminary dilatation, until it admits the first finger and the tip of the thumb, is done with graduated sounds. If complete effacement is present, a preliminary dilation is unnecessary. The index finger and tip of the thumb are now introduced into the cervix. The index finger is strongly flexed, while the thumb remains rigid. As the first hand tires it is withdrawn and the second substituted. As soon as possible two fingers and the thumb are introduced, and dilatation is continued by strongly flexing both fingers, with the thumb extended. Gradually the fourth and fifth fingers are introduced. The operation is completed by spreading out the fingers and thumb laterally until the cervix is completely relaxed and flush with the vaginal walls. The membranes should be preserved throughout the operation. Attention is called to the danger of rupture of the cervix after the introduction of four or five fingers.

The Bimanual Method (known as the Edgar method in this country, and the Bonnaire method in Europe) is preferred when the cervix lies low in the pelvis and is more accessible to the hands of the operator. This is the method of choice whenever possible. **Technique—Bimanual Method:** The patient is surgically prepared and under deep anaesthesia the index finger of the left hand is passed into the cervix and by hooking the distal phalanx within the internal or external os (depending upon the effacement of the cervix), the cervix is drawn downward and a little forward against the posterior pubic wall, and fixed there. The index finger of the right hand is now passed into the cervix,

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using the left finger as a guide. When the two fingers have secured a firm hold in the cervix, dilatation is effected by pulling them in opposite directions. As the cervix yields to pressure, more fingers are introduced until all are within the cervix. The thumb is not used in this operation. Traction is made antero-posteriorly, laterally, and obliquely. It is necessary to completely relax the cervix, and before dilatation is considered complete the operator must be able to touch the lateral pelvic walls with the fingers of his opposite hands (which are within the cervix) or the hollow of the sacrum and the posterior surface of the pubis.

(2) Metreurysis

When the condition of the mother and child permit a longer period of time for cervical dilatation, the use of rubber bags, or colpeurynters, is strongly recommended. Metreurysis is the safest and most physiological method of dilating the cervix. The action of the balloon is three fold, i. e., dilator, exciter of uterine contractions, and tampon. The conical form of the unelastic balloon now generally used (Voorhees' bags) simulates the hydrostatic action of the unruptured membrances. By virtue of its power in exciting uterine contractions through pressure on the cervical ganglia, it becomes a valuable agent in long and uneffaced cervices. Its action as a tampon is of value in retaining the liquor amnii in the uterine cavity when the membranes have ruptured prematurely, and in preventing placental separation and hemorrhage in placenta previa, during the first stage of labor.

Types of Bags—The **Braun** bag is a pear-shaped, thin rubber bag, the size varying in proportion to its distention. It is a true **colpeurynter**, and is placed in the vagina, and not in the uterus.

The **Barnes** bags are fiddle-shaped thin rubber bags, intended to lie within the cervix (intra-cervical metreurysis) with the upper portion lying just above the internal os, and the lower part at the external os. These bags, by reason of their small size, act only as irritants. They are difficult to retain in situ, and a vaginal tampon is necessary to prevent extrusion of the bag into the vagina. They are slow in action and their use is not to be recommended.

The **De Ribes** bags are inelastic cone-shaped metreurynters, constructed of silk and rubber. Only the small sized bag is used, on account of the danger of displacing the presenting part. This type has been superceded by the Vorhees bags.

The **Voorhees** bags are inelastic, cone-shaped, linen-rubber bags, provided in four sizes, varying from the "two finger dilatation" size to the large size giving five fingers dilatation when the bag is expelled.

The **Muller** bag is exactly the same as a Voorhees bag, but is provided in a size giving complete dilatation when the bag is expelled.

Indications for the Balloon—(1) It forms an ideal instrument for the **induction of premature labor.** The mechanism is nearly perfect, if uterine irritability is present. The balloon makes pressure from above downward and is capable of producing dilatation with a minimum amount of laceration.

(2) The balloon is valuable in **preventing premature rupture of the membranes.** When the presenting part does not adapt itself to the lower uterine segment, as in a breech, face, brow, or shoulder presentation, the membranes may rupture in the first stage, with disastrous results. While the Braun colpeurynter has been recommended in these cases, I strongly urge the use of the large size Voorhees bag, or a Muller bag, instead.

(3) In **dry labor** if dilatation is not progressing satisfactorily, the introduction of a Voorhees bag will retain the fluid still in utero, and will dilate the cervix rapidly and physiologically.

(4) The metreurynter is used to **stimulate uterine contractions.** If the first stage is unduly prolonged, and pains inefficient, the introduction of a Voorhees bag will almost invariably give excellent results.

(5) The bag is used to **prepare the soft parts for rapid delivery.** In stenosis of the cervix, not due to carcinoma, or in atresia of the vagina, the balloon is often efficient. In cardiac diseases, threatened eclampsia, premature separation of the placenta without grave symptoms, and similar accidents, the soft parts can be rapidly dilated and prepared for operative delivery with the bag. In these cases in which time is an important element, a two-pound weight, attached to the outlet tube, will produce traction and hasten dilatation.

(6) In **placenta previa** metreurysis is becoming a valuable method of treatment, where a special effort is being made to save the child. The fetal mortality following Braxton-Hicks version is very high and the method is reserved for premature children or in emergency where other methods of treatment are not available. If the bag is used early in labor, before the mother is exhausted from loss of blood, the attendant will save many children that otherwise would be lost.

Technique—The apparatus required will consist of two or three selected bags, an instrument for the introduction of the bag, either the special "bag introducing forceps" or a ring type sponge holder; an instrument for filling the bag, either a Matchless all metal 6-ounce syringe, or a rubber bulb pump; a small clamp, such as is used on the Murphy drop method apparatus. If there is absolutely no dilatation, in addition to the above it will be necessary to provide a set of graduated sounds, and a Goodell dilator. All instruments and bags are sterilized by boiling. The bags should be carefully wrapped in towels before boiling, since contact with the metal sterilizer or instruments will ruin them.

The patient, surgically prepared, in the dorsal lithotomy position, is examined to note dilatation, and position of cervix. **No anaesthetic is required** if there is sufficient dilatation of the cervix to permit the introduction of the bag. The balloon is rolled into as narrow a compass as possible and grasped in the introducing instrument. Two fingers are passed into the cervix, and the bag, under the guidance of these fingers, is gradually introduced until its lower portion is well within the internal os. The introducing forceps are now withdrawn while the fingers hold the bag in position. It is well to keep the bag in close apposition with the anterior lip of the cervix during this period. Connection is now made with the filling instrument and the bag filled with sterile water or ½% liquor cresolis comp. As the bag distends it lies directly above the internal os. When the distention is sufficient, as shown by the examining fingers, the outlet tube is securely clamped, sterile vulvar pads applied, and patient treated as though in begining normal labor.

The fetal heart tones should be taken immediately after the introduction of the bag, to provide against the asphyxia due to pressure upon the cord by the bag.

The patient need not be put to bed, but may be allowed to walk about during labor. Pains usually appear in from thirty minutes to two hours, and the bag will be expelled in from eight to twelve hours in the average case. Traction on the outlet tube is not made unless there is a definite indication to hasten dilatation. Spontaneous delivery is to be expected except in cases in which the bag was used for abnormalities of position or pelvis.

(3) Instrumental Dilatation

Bossi has recommended a four-branch steel dilator equipped with a scale to show the amount of dilatation, and intended as a cervical dilator at full term. The use of this instrumental dilator has been followed by extensive lacerations involving cervix, lower uterine segment, tissues of broad ligaments, etc. It is impossible to over-estimate the amount of damage which can be caused by this instrument, even in the most competent hands, since the operator can never tell when a tear is about to take place, nor the direction which it will take. The instrument is only mentioned to be condemned.

(4) Cervical Incisions (Known as Duhrssen's Incisions)

The field of usefulness of this operation is very limited because the incisions are safe only after complete efftcement of the cervix. Effacement is essential since the cervical vessels are retracted and away from danger of laceration only after complete effacement. Under wide exposure of the field by broad specula the cervix is grasped and cut between two heavy Ochsner forceps. It is best to make three incisions, two of them antero-lateral, and one posterior. The principal dangers are hemorrhage and extension of the incisions. The indications are found in complications bringing danger to mother or child, when the cervix is effaced but not dilated. Rigid cervix, scars, conglutinatio cervicis, are occasional indications. It is advisable to repair the lacerations at once.

(5) Colpohysterotomy (Vaginal Caesarian Section)

This is an operation having as its object the complete dilatation of the cervix. It is not an operation of delivery. The vaginal Caesarian section differs from abdominal caesarian section in that the success of delivery depends upon the size of the pelvis, whereas in the classical operation the delivery is not affected

by the size or shape of the pelvis. In other words, in the vaginal operation the resistance to be overcome by the operation is that of the soft parts, i. e., cervix and lower uterine segment, while in the abdominal operation the chief indication is to overcome bony resistance, i. e., deformed pelves.

If the pelvis will not allow the passage of the fetus the vaginal operation is contraindicated.

Indications—(1) When the cervix is not dilated and an indication arises for rapid delivery, as in eclampsia, premature separation of the placenta, etc. (2) When the cervix is diseased, and nature is unable to overcome the obstruction, as in carcinoma of the cervix, etc.

Conditions—(1) The pelvis must be sufficiently large to permit the passage of the unmutilated child. (2) The child must be living, unless the indication is maternal. (3) The cervix must be accessible. The operation is usually very difficult after the eighth month.

Technique—The patient is surgically prepared, placed under deep surgical anaesthesia, in the dorsal lithotomy position. The cervix is drawn down to the outlet, which is enlarged, if necessary, by deep episiotomy extending up one or both lateral sulci. In cases in which there is difficulty in drawing the cervix into the field, the introduction of a complete dilatation metreurynter into the cervix, filling and making traction upon the outlet tube, will be a great help.

Short, wide retractors enlarge the field of operation. An inverted T-shaped incision is made in the anterior vaginal wall, the horizontal part of the incision being made at the cervico-vaginal junction, and the vertical incision beginning about one inch posterior to the meatus. The triangular vaginal flaps thus outlined are then separated from the uterus and the bladder, by dissection with a gauze sponge.

The next step in the operation is to separate the bladder from the uterus and to raise the bladder to expose the lower uterine segment. This separation is done chiefly by gauze sponge dissection.

Now one blade of a blunt pointed scissors is introduced into the cervical canal and the cervix is split in the median line up to the point of peritoneal reflection, usually about 10 cm.

The operation of delivery now takes place. This is either a forceps or a version depending upon the conditions present.

The incisions are now sutured with chromic catgut. It is advisable to place a gauze wick in the space between the bladder and lower uterine segment for 24 hours. The drainage at this point is sometimes excessive.

Complications—This is a difficult operation from a technical standpoint. The peritoneum may be opened accidentally; it may be impossible to draw down the cervix; hemorrhage may be very troublesome; the bladder may be injured, and a vesico-vaginal fistula may result. This is not an operation to be undertaken by one who is untrained in vaginal surgery.

DILATATION OF VAGINA

Indications—Dilatation of the vagina is rarely necessary except in the presence of scar tissue. Occasionally in very neurotic primiparae artificial dilatation may be necessary.

Methods—(1)—**Manual Dilatation.** (2) **Deep episiotomy,** extending incision up lateral sulci. (3) **Colpeurynter.** Either a Braun bag, or better still, a Pomeroy bag, may give good results. The Pomeroy bag will give complete dilatation of cervix and vagina when filled, and must be introduced and filled under anaesthesia. It will take from 30 minutes to 1½ hours to fill the bag.

DILATATION OF VULVA

Episiotomy

Objects—(1)—To enlarge vulva to permit passage of head. (2) To prevent a ragged tear, when a laceration is inevitable.

Indications—(1)—Resistant perineum, causing delay in the passage of the head through the vulva. (2) Pathological conditions of the vulva, such as scars, syphilis, etc. (3) Mechanical disproportion, due to abnormal size or mechanism. (4) The necessity for rapid delivery when it is not possible to give the perineum time to dilate. (5) To divert an inevitable laceration away from the anus.

Time—It is best to wait until the head has distended the levator ani, as shown by the opening and pushing downward and forward of the anus, and only the resistance

of the vulvar outlet is to be overcome. If at this point, by vaginal inspection or palpatation, a beginning laceration is discovered, it is anticipated by episiotomy.

Technique—The incision is made in the perineum at a point lateral to the posterior mid point. There is no good reason for electing either side, to the exclusion of the other. One blade of the scissors is laid on the vaginal mucous membrane, while the other rests on the skin of the perineal body. Light anaesthesia is necessarily advisable. The extent of the episiotomy will depend upon the indication. Usually 1 or 1½ inches is sufficient. The laceration should be repaired at once.

DILATATION OF THE PELVIS

Symphysiotomy and Hebosteotomy

Def.—An operation for the widening of the pelvic cavity by the division of the joint at the symphysis, is called **symphysiotomy.** By **Hebosteotomy** or **Pubiotomy** we mean an operation for the enlargement of the pelvic cavity by the division of the pubic bone.

Effect upon Pelvic Measurements—It has been found that a separation of 6 cm. at the symphysis will increase the true conjugate about 1 cm. This separation of 6 cm. is the maximum allowable, on account of the danger of injury to the sacro-iliac joints if greater separation is allowed.

This maximum separation of 6 cm. will result in an increase in the transverse diameter of about 3 cm. This is of inestimable importance in a funnel-shaped pelvis.

Indications—(1) A contraction of the inlet, with a true conjugate of not less than 7 cm.

(2) A funnel-shaped pelvis, with moderate contraction (Bi-ischiatic not less than 6.5 cm., posterior sagittal not less than 8.5 cm.).

(3) **Rarely,** if impossible to deliver the aftercoming head, in a breech. Baby must be living. I do not recommend this.

Division of the pelvis actually comes in competition with Caesarian section, in border line cases, where the test of labor has shown that spontaneous delivery cannot take place, and the abdominal operation is contraindicated. Its field is very limited.

Contraindications—(1) Pubiotomy should not be selected when the pelvis is too small to allow the passage of the

head after the division of the pubic bone and the separation of the ends for a distance of 6 cm.

(2) Pubiotomy should not be done in an infected case.

(3) Pubiotomy should not be done if the fetus is dead or dying.

(4) Complete dilatation is a pre-requisite for the operation.

Comparison, Symphysiotomy vs. Hebosteotomy—Which of these operations shall be chosen?

Symphysiotomy vs.	Hebosteotomy
1. Incision through cartilage heals less readily.	1. Incision through bone heals more readily.
2. Deprives urethra and bladder of natural supports.	2. Lateral incision does not effect ligaments of urethra and bladder.
3. Less appartus required.	3. More equipment necessary.
4. Less surgical and exact.	4. More surgical.

Symphysiotomy at present is considered a procedure of the past and is described for purposes of comparison.

Complications and Dangers—Hemorrhage during the operation is sometimes uncontrollable, and secondary hemorrhage is common. Lacerations may extend into vagina, bladder and urethra, and often result in fistulae. Infection is very common. Injury to the sacro-iliac joints, and non-union of the severed bones, with resulting interference in locomotion, are not uncommon results. These disadvantages, together with the uncertainty of delivering a living child, have caused me to strongly recommend that these operations be discarded. The maternal mortality is about 10%.

Technique, Symphysiotomy—(1) The patient is surgically prepared, anaesthetized, and placed in the dorsal lithotomy position, her legs being held by two assistants. (2) In the **open method** (French method) an incision is made along the front of the symphysis and the joint divided from before backward, under direct inspection. The incision begins in the median line, just above the symphysis, and stops just above the clitoris, which is displaced to one side to avoid wounding it. A sound should be placed into the bladder as a guide.

(3) In the **subcutaneous method** (American method) a small incision is made a little above the sub-pelvic arch, and under the elevated clitoris a narrow tenotomy knife is passed, with the point close to the joint, up to within one-half inch of the top, separating the overlying soft tissues from the joint. A probe pointed bistoury is now substituted for the tenotomy knife, and under the guidance of a finger in the vagina, the symphysis is divided from above downward, and from before backward. A sound in the bladder is advisable as a guide.

(4) **When the joint is severed** the assistants are particularly cautioned against allowing the cut ends to separate. Separation should not exceed 6 cm., and must be very gradually done, under the direction of the operator.

(5) **Immediate delivery** is now advisable. Forceps is the method of choice. Version is to be chosen only when a forceps is impossible. Extreme care must be taken in a version to prevent overseparation, and extensive lacerations.

(6) The soft parts over the joint are sutured, sterile dressing applied, and a strip of adhesive plaster, 4 inches in width, preferably on a moleskin base, is passed tightly around the pelvis, over the trochanters. The knees are bound together with a towel.

Technique, Hebosteotomy—(1) Surgical preparation, complete anaesthesia, legs held by assistants, and not by leg holders.

(2) The **subcutaneous method**, called Doderlein's operation, is recommended. An incision 2½ cm. long is made over the pubic spine, and parallel with the superior border of the symphysis. (Note: Either side may be chosen.) A finger is now passed downward, through the incision, separating the tissues from the posterior surface of the bone.

A Doderlein needle, or an aneurism needle, is now passed into the incision and guided by the finger, closely follows the posterior surface of the pubic bone. When the lower border of the bone is reached the needle is forced forward beneath the skin of the labium majus, when it is cut down upon and allowed to emerge.

Into the eye of the needle is hooked the end of the Gigli saw, which is now pulled through behind the symphysis. (Note: A silk ligature may be threaded on the needle, and used to draw through the Gigli saw.)

Handles are now fitted to the saw, and the bone completely severed.

In sawing care should be taken to keep the line between the two handles as straight as possible, in order to avoid breaking the saw. **Hemorrhage** is rather free during this step of the operation, but as a rule may be controlled by pressure upon the pubis. Care should be taken to avoid sawing through the skin, and thus converting the operation into the open type.

(3) **When the joint is severed** the assistants are particularly cautioned against allowing the cut ends to separate. Separation should not exceed 6 cm., and must be done very gradually, under the direction of the operator.

(4) Immediate delivery, preferably by forceps, is now done. Version is to be chosen only when a forceps is impossible, since overseparation and resulting sacroiliac injuries, frequently follows this method of delivery.

(5) The small opening in the labium majus is now sealed with collodion, the upper wound closed with sutures. (Small wick drain is frequently advisable, on account of extensive oozing following operation. Remove in 24 hours.)

(6) A strip of adhesive plaster, four inches in width, preferably on a moleskin base, is passed tightly around the pelvis, over the trochanters. The knees are hobbled with a towel.

After treatment, Symphysiotomy and Hebosteotomy—(1) The patient is kept on a Bradford frame for at least two weeks. In symphysiotomy the minimum is three weeks.

(2) Patient lies on back for four days, then may turn on side.

(3) Patient is allowed to walk two or three days after leaving frame.

CHAPTER 18

Operations to Improve Attitude or Position

VERSION

Definition—By version is meant the artificial transformation of one presentation of the fetus into another.

Objects—Our object is to change a pathological, or a relatively pathological position of the fetus, to one that is

normal, or relatively normal. For instance, we may change a transverse presentation (pathological) to a breech (relatively normal), or in case delivery is urgently needed, we may change a head (which in this case may be relatively pathological) to a breech (relatively normal).

Varieties—(1) **Cephalic version,** in which the head is made to present. (2) **Podalic version,** in which the breech is made to present.

Methods—(1) **External version,** (Wiegand version) the change in presentation is brought about by external manipulation only. The **cervix is usually closed.**

(2) **Combined, or Bipolar version,** (Braxton-Hicks version) the change in presentation is brought about by manipulation upon one fetal pole by two fingers, which are introduced within the cervix, while the other hand externally works through the abdominal wall on the other fetal pole. The **cervix is partially dilated.**

(3) **Internal version,** (Carl Braun version) the change is made by introducing the entire hand into the uterus, and bringing down the part desired. The **cervix must be completely dilated.**

External Version

In this method the change in presentation is brought about by external manipulation only. While the scope of external version may occasionally include the establishment of a breech presentation, its chief value lies in the conversion of a breech, or a transverse, to a cephalic presentation.

Conditions—(1) **The operation must be possible.** The fetal body must be movable, and yet not so movable that there is little probability that the desired presentation may be maintained. The membranes must be intact.

(2) **There must be no indication for the rapid termination of labor.** Rapid delivery always calls for a podalic version and extraction, if any type of version is indicated.

(3) The pelvic inlet must be large enough to admit the head readily (in external cephalic version). Since the most frequent cause of transverse presentations are contracted pelves, careful pelvimetry is essential. If the head will not enter the inlet, it will invariably resume its former position.

(4) **There must be no complications,** such as hydramnios, multiple pregnancy, prolapse of an arm or cord, etc.

(5) The uterine and abdominal walls must be relaxed, and there must not be too much fat in the abdominal wall.

Difficulties—(1) Rigid and sensitive abdominal walls. (2) Tonic contractions of the uterus. (3) Deficiency of liquor amnii. (4) Relaxation of abdominal and uterine walls, resulting in the inability to maintain the fetus in a fixed position.

Advantages of External Version—(1) Ease of accomplishment.

(2) Freedom from danger to mother and child.

(3) All danger of infection is avoided.

Technique—External cephalic, or Wiegands version. The patient should lie upon her back, with the knees flexed. No anaesthetic is given, since the operation is painless. The hands should be warm, and extreme gentleness used, since as a result of any external irritation or pain the uterus may contract upon the fetus and impede the progress of the version.

One hand is placed over the head, and the other over the breech. Alternately, between the contractions that take place during pregnancy, the head is gently forced over the inlet, and the breech into the fundus.. In order to maintain the fetus in its new position, a thick compress of gauze is placed over that portion of the abdominal wall where the head formerly lay. Two thick rolls (a Turkish towel, rolled tightly, will do) are placed, one on either side of the uterus, and aided by a wide, very tight abdominal binder, serve to keep the fetal body in its longitudinal presentation, and as immovable as possible.

It is advisable to have the patient stay in bed for at least one week, and to lie upon the side where the head formerly lay.

Practical Application—External cephalic version may be attempted on a transverse presentation, seen late in pregnancy or during early labor. It is advised in a breech presentation, at the same period, but in the opinion of the author, is of very questionable value. The procedure does not give definite results, and the operator is always in doubt as to the permanency of the presentation obtained by external version. On account of the danger of converting a breech into a

transverse presentation, the author never advises its use for the purpose of converting a breech to a cephalic presentation.

Combined or Bipolar Version

Version before complete dilatation of the cervix is done for some indication which prevents us from waiting until the os will admit the entire hand. It is always more difficult than an internal or Carl Braun version, and has the disadvantage of preventing an immediate extraction (on account of incomplete dilatation). The longer we have to wait after a version is complete, before we extract, the greater is the danger of fetal asphyxia. While Bipolar Version, or Braxton-Hicks version, as it is commonly termed, may theoretically be subdivided to include cephalic version through a partially dilated cervix, and podalic version through a partially dilated cervix, yet in its practical application the version is always meant to include the bringing down of a foot (podalic).

Indications—(1) The main indication for a Braxton-Hicks version is a placenta previa, in which before the cervix is completely dilated, it is desired to pull down one leg and thigh to act as a uterine tamponnade to control hemorrhage.

(2) In certain cases of prolapse of the cord, in order to prevent pressure upon the cord by the bony head, while preparations for manual dilatation and extraction are being completed.

Conditions—(1) Membranes must be intact, or very recently ruptured.

(2) The fetus must be freely movable.

(3) The cervix must be dilated to admit two fingers.

Technique—The patient, surgically prepared and anaesthetized, is placed in the dorsal lithotomy position. One of the operator's hands is introduced into the vagina, while the other is used for external manipulations through the abdominal wall. Two fingers are passed up through the cervix to the presenting part, which is pushed upward and laterally, while at the same time the external hand forces the opposite pole downward toward the inlet.

The membranes are kept intact, if possible, until the operator is able to grasp a foot with the internal fingers. If it is impossible to seize a foot and draw it down with the internal fingers, we have a "Transverse

arrest of a Braxton-Hicks Version." (Note: In placenta previa the best treatment for this complication would be the insertion of a colpeurynter above the cervix and placenta, or in the absence of this, manual dilatation and internal version.)

We are satisfied to get either foot. Traction is now made on this lower extremity, from within, while the elevation of the head into the fundus, is assisted by the external hand. Extreme care is necessary in doing the extraction, in order to avoid extensive lacerations. Traction should be very gentle: only sufficient to control the hemorrhage. Take time—hours if necessary.

Advantages—(1) Can be performed before the cervix is sufficiently dilated to admit the entire hand.

Disadvantages—(1) The two fingers in the cervical canal have very little control over fetal parts which come within their reach.

(2) On account of the condition of the cervix, extraction cannot immediately follow the version, and hence the child may be lost from asphyxia.

Practical Application—In Braxton-Hicks version we have an extremely valuable procedure for the control of hemorrhage in a placenta previa, when the colpeurynter is not available. The author has never seen a case in which bipolar cephalic version was indicated.

Internal Version

In this precedure the entire hand is inserted into the uterus, instead of two fingers as in Bipolar Version. The varieties are internal cephalic version, and internal podalic version. Of these podalic version is by far the most important, since any variety of cephalic version is unsatisfactory.

Internal Podalic Version (Braun Version)

Indications—(1) Transverse presentations.

(2) Unfavorable attitude, especially deflexions, causing face or brow.

(3) Prolapse of cord.

(4) Placenta previa.

(5) When rapid delivery is indicated, as in hemorrhage, eclampsia, rupture of uterus, failing compensation of heart, etc.

(6) When the aftercoming head is thought to be better adapted for passage through the pelvis than the

usual cephalic presentation, as in a flat pelvis. This is known as **"Prophylactic Version."** Prophylactic version is at times indicated in that small percentage of cases seen first at term, in which hebosteotomy and Caesarian section are refused, and in which the patient has the history of a number of dead babies as a result of expectant treatment. It is not suitable for generally contracted and funnel-shaped pelves, and in the opinion of the author, has a very limited field and gives very unsatisfactory results.

Conditions—(1) Cervix must be completely dilated.

(2) The membranes must be intact at the beginning of the procedure, or but recently ruptured.

(3) There must be no great disproportion between the head and the pelvis. Version should not be attempted if the true conjugate is below 8 cm. in a flat pelvis, or below 8½ or 9 cm. in a generally contracted pelvis.

(4) There must be no threatened rupture of the uterus. Version should not be performed if the uterus contracts tetanically upon the fetus, or if there is not good relaxation betweens pains.

(5) The fetus must be freely movable, and in head presentations the head should not have entered the pelvic cavity.

(6) The child should be alive. Unless the indication arises on the part of the mother, for rapid delivery, it is best not to perform a difficult operation for the sake of a dead baby, but rather spontaneous delivery of the premature or macerated fetus, or perform embryotomy, if necessary.

Technique—Internal Podalic Version. The patient is surgically prepared, under deep surgical anaesthesia, in the dorsal lithotomy position, upon an operating table.

Choice of hand: In cephalic presentations the hand chosen should be the one whose palm faces the fetal abdomen, e. g., L. O. A., left hand; R. O. A., right hand. In transverse presentations the hand inserted should be that which corresponds to the side of the mother in which the breech of the fetus lies, e. g., L. D. A., left hand; R. D. A., right hand.

Rupture of membranes: If the membranes are intact at the time of operation, they may be ruptured by one of two methods: (1) **Levret's method.** The fingers are passed through the cervix and the membranes ruptured as they lie opposing the os. In other words,

the hand is passed into the uterine cavity as though the membranes were broken. The hand then acts as a ball valve, and prevents the further escape of liquor amnii until the operation is completed. (2) **De Leurye** recommends that the hand be passed up between the membranes and the uterine wall to the level of the feet. The hand is then passed through the membranes, the foot grasped, and the version completed. The object is to keep the membranes intact until the hand is ready to grasp a foot. This method is dangerous because of the danger of sepsis.

Choice of foot to be grasped: This point has been unduly emphasized, and is of very little importance. Theoretically, in cephalic presentations the foot to be grasped is the anterior foot, e. g., in L. O. A., the right foot, and in R. O. A., the left foot. If the posterior foot is grasped the anterior hip may catch upon the symphysis, or the back may rotate posterior.

In transverse presentations, with the back anterior, the lower foot is grasped, as its corresponding hip is nearest the symphysis, and easily rotates anterior and under it. If the upper foot is grasped the back may rotate posterior, and the other hip, which will come anterior, may then catch on the symphysis. With the back posterior, the upper foot is grasped, for reasons already given. For example, in L. D. A., right foot; in R. D. A., left foot; R. D. P., left foot; L. D. P., right foot.

Simplified rules: Breech to operator's right, right hand inserted and left foot grasped; breech to operator's left, left hand inserted and right foot grasped.

Practical applications: Given a case in which there is an indication to deliver, and the conditions present are those calling for a version, the patient is prepared, anaesthetized, and under the most rigid aseptic conditions the operator makes a careful examination, if necessary introducing the whole hand into the vagina, in order to be absolutely sure of the conditions present, and the position and presentation. Having assured himself that all of the conditions for version are present (if necessary, he artificially produces them by manual dilatation, etc.), the operator introduces his hand (see choice of hand) through the membranes, and up to the part to be grasped. It is not essential to grasp a particular foot (see choice of foot to be grasped), but rather than lose time the operator grasps the first foot identified. In order to facilitate

this the operator's other hand grasps the pelvic pole and pushes it downwards towards the internal hand. (This may be done by an assistant.) With the grasping of the leg by the internal hand the external hand changes its position and purpose, going from the pelvic pole (which it has pushed towards the internal hand) to the head which it now pushes toward the fundus. Not until the head and shoulders have been moved from the pelvic inlet dare the internal hand produce strong traction upon the grasped foot, and version cannot be considered complete until the knee appears at the vulva.

As soon as the version is completed, the child is extracted, as in "Breech Extraction."

Preservation of the membranes up to the time version is done is of the utmost importance. With the draining off of the liquor amnii, the walls of the uterus contract about the fetus, the contractions increase in intensity and the fetus becomes firmly fixed in its abnormal position, so that any attempt to do version may end in rupture of the uterus, and will most certainly do so in the presence of a contraction ring and a thinned out lower uterine segment. As it is in just such cases that the child is nearly always lost, craniotomy should always be done on dead or dying children, and the mother saved the danger of a useless operation.

If hemorrhage occurs during version it may come from one of four sources: (a) Ruptured cord. (b) Premature separation of the placenta. (c) Lacerated cervix. (d) Ruptured uterus. In the first two instances immediate extraction is imperative, while in the lacerated cervix great care must be exercised in order to prevent the extension of the laceration, and in ruptured uterus immediate laparotomy is indicated.

If the head fails to leave the pelvic inlet after the foot is grasped and traction applied, the condition is known as the transverse arrest of a Carl Braun version. There are five means of treatment: (1) Watchful expectancy. The uterine walls frequently contract when stimulated or irritated, as by a version, but if the operator waits for a few minutes the walls will relax and he may then proceed. (2) In order to abolish all the reflexes possible, it is well to put the patient under deep anaesthesia. (3) **The double manual of Justine Siegemundin.** In this method we should apply a version sling to the foot that is partly brought down. If the foot is high,

it may be very difficult to do this. If the primary position was a left dorso anterior (L. D. A.) the operator faces the patient, and with the right hand pulls downward and to the left, with the sling, while his left hand is introduced into the vagina in front of the sling and the leg, and aims to push the presenting part upward and to the left. As soon as the shoulder is lifted away from the inlet the internal hand is partially withdrawn and traction is made on the sling. By these alternating motions, the shoulder is forced out of the inlet, and the breech is enabled to enter. This maneuver depends for its success upon the skill and experience of the operator. The rotation of the body should not be attempted until the knee is in the pelvis. In late cases, where the lower uterine segment has become somewhat thinned out, and a contraction ring is beginning to develop above the presenting part, it may be very difficult to push the head above the contraction ring, since pressure upward with the internal hand merely forces the head into a pocket of the lower uterine segment. Brosea recommends passing the hand between the head and the uterine wall, the finger tips lying within the fundus and within the contraction ring. Traction is then made on the foot and it is claimed that the head will slide into the fundus more easily as the hand serves as a guide or an inclined plane to the head and the sharp corner of the contraction ring is avoided. (4) If this method fails we bring down the other foot and perform the double manual on both feet in the manner described above. (5) If these methods fail, or if the fetus is too firmly fixed to allow of version without great danger of rupture, embryotomy should be performed.

Dangers of Internal Podalic Version—Maternal: (1) Infection. (2) Rupture of uterus. (3) Lacerations of the birth canal. **Fetal:** (1) Death of the child from delay in the delivery of the aftercoming head. (2) Fractures, especially of the humerus, femur, clavicle, and bones of the skull. (3) Injuries to brain, cord and nerves.

Examination after Internal Podalic Version—It is very important that the entire uterus be examined after every version. The character of the operation is no guide as to the probability of laceration, as a version may appear easy to the operator, the walls of the uterus relaxed, and the ideal conditions for the opera-

tion present, yet a rupture of the uterus may result. In other cases, the great difficulty of the version might lead one to think of rupture and a careful examination will show that the uterus is intact. In order to satisfy ourselves, therefore, we should go over the uterus very carefully to determine its exact condition.

Internal Cephalic Version

Internal cephalic version has an extremely limited field of usefulness and is very seldom employed. When the cervix is fully dilated internal podalic version is to be preferred as being easier and more certain of success. When cephalic version is done, delivery must terminate spontaneously, since the application of forceps to the non-engaged head is contraindicated. This method of version is never attempted by the author.

Conditions—(1) The cervix must be dilated for the **Busch-Braun** version, and admit two or three fingers for the modified **D'Outrepont** version.

(2) The head must be movable.

(3) There must be no threatened rupture of the uterus.

(4) The membranes must be but recently ruptured.

(5) The pelvis must be normal or but slightly contracted, so that a subsequent podalic version will not become necessary.

(6) There should be no indication for the rapid termination of labor.

Methods—D'Outrepont version, modified. The original operation called for a cervix sufficiently dilated to admit the hand. The hand is passed through the cervix and is applied to that part of the fetus immediately above the inlet. The external hand is applied over the head. By alternate pushing and pulling, the head is brought down to the inlet, and the breech is forced to the fundus. This operation can be modified so that its usefulness can be increased. The earlier the version is performed in labor, the easier it is and it may be that in waiting for the cervix to dilate completely, retraction of the uterine walls takes place and the operation becomes impossible. The passing into the uterus of the entire hand has its objections. When the cervix admits two or three fingers, they are passed in through the os and applied to the presenting part. The external hand lies over the head. If the head lies on the left side, the left hand is used internally. The

arm and the shoulder are pressed out of the inlet and away from the head while an assistant pushes upward on the breech. The external hand pushes the head into the inlet. This is practically a Braxton-Hicks version on the head. The advantages of this modification are that it can be done early in the first stage of labor when the child is movable, and when retraction is the uterine walls seldom occurs.

Busch-Braun Version—This is called the direct, combined cephalic version, because we aim to grasp the head directly with the internal hand. That hand whose palm points towards the head: head left, right hand, is used internally. This hand seeks to grasp the head as firmly as possible, and to pull it down to the inlet, while the external hand pushes up on the breech. As soon as the head lies above the inlet, the breech is held over on that side where the head primarily lay in order to prevent a return of the malposition. The new position is maintained manually, until the head is forced into the pelvis, under the influence of the uterine contractions. This operation, in the opinion of the author, is never indicated.

RECTIFICATION OF FACE OR BROW PRESENTATIONS

Experience has shown that when the face or brow presents, the child can be born only if anterior rotation of the chin occurs during the mechanism of labor. If the chin rotates posterior, and this condition persists after engagement and descent of the head, the birth of a living child, by any means, is not to be expected. It must not be forgotten, however, that posterior rotation of the chin may be, and usually is, but a step in the mechanism of labor, which is corrected spontaneously when the chin reaches the pelvic floor. The unfavorable attitude may be corrected either by internal podalic version (if done in time), or by changing the attitude to one of flexion, by means of certain maneuvers to be described.

In the normal attitude of flexion, the spinal column of the fetus assumes a C-shaped curve, while in deflexion the curve is somewhat that of the letter S. In the attitudes of deflexion, therefore, one must take into consideration the attitude not only of the head, but that of the trunk also.

Methods—(1) **Schatz method.** This is an external method, and has to do with the attitude of the trunk only.

The membranes must be intact, and the child freely movable. The abdominal walls must be relaxed. The easier it is to convert a brow or face to a vertex presentation, the more liable the head is to return to its original position. This method is not reliable, and will rarely give satisfactory results. It should be attempted, however, if a face or brow is diagnosed in the latter weeks of pregnancy.

Technique—No anaesthetic required. The patient lies upon her back, and the operator stands on that side of the patient on which the fetal back lies. That hand whose palm points towards the breech grasps the anterior shoulder and pushes it upward, in order to loosen the head from the inlet. At the same time the second hand pushes the buttocks of the child away from the operator (and toward the side to which the baby's face is directed), and so changes the curve of the back from an "S" to a "C." Flexion of the trunk aids in the flexion of the head. The head is now forced into the inlet, if possible. After every operation of this character, it is well to maintain the breech on that side of the abdomen towards which the face was directed. This may be done with appropriate abdominal binder and padding. (2) **Baudeloque's method.** This is the internal method, and is to be preferred later in labor, where it is impossible to free the head from the inlet by external manipulations. The cervix should be dilated to admit at least two fingers, and the maneuver will be greatly facilitated if there is four finger dilatation. Two to four fingers of that hand whose palm points towards the forehead are passed up to the head, and press up on the sinciput until the head is raised out of the pelvis. It is not possible to flex the head while it lies in the pelvic cavity. If the head cannot be pushed up, or if there are signs of a thinned out lower uterine segment, or a threatened rupture of the uterus, the operation is to be abandoned. After the head is above the inlet, or at least so movable that it can be flexed, the internal fingers are passed over the occiput, and digitally flex the head. As the occiput comes down it is turned anterior so far as possible, provided the inlet is normal. The attitude of flexion is maintained manually until a few pains have fixed the head. The external hand assists in these manipulations.

(3) **Thorn's method.** This is a combination of the above methods, and takes into consideration the attitudes of both the head and trunk. The technique in an L. M. A. position is given as an example: The patient is anaesthetized, lightly, and the operator passes the left hand into the pelvis to the occiput, which is grasped and pulled downward. At the same time the right hand is passed over the chest of the fetus externally, and pushes it in the direction toward which the occiput points (to the right), the two hands thus securing flexion of the head. The buttocks of the fetus are at the same time pushed to the left by an assistant, and the attitude of the fetus is, in this combined method, re-established. Thorn gives the following contraindications: (a) A primary face presentation. (b) Marked disproportion. (c) Immediate danger to mother or child. (d) Thinning out of the lower uterine segment.

It should be our aim to preserve the membranes in every case of face presentation until dilatation is complete. The membranes are likely to rupture prematurely, and we should always take steps to prevent this if possible. We should have clearly fixed in our minds the series of operations that may become necessary in any given case, and to preserve, as far as possible, all the necessary conditions for the important operations. For example: Given a mento posterior position, with the cervix dilated to two fingers; an attempt to convert into a vertex failed, but during the conversion the membranes were ruptured. As the liquor amnii drained away the uterus retracted upon the fetus, thus rendering version impossible when dilatation was complete. The forceps are contraindicated, and embryotomy closes the scene. Here the attempt at conversion destroyed the necessary condition for the version. Of course, the conversion might have succeeded, but the probability of success in this type of operation is not good. The conditions for version should have been jealously guarded in this case, as that operation offered the best chance for the child. Another example: A mento right anterior, cervix completely dilated, with the membranes just ruptured. Attempts at conversion succeed, but it is impossible to hold so that forceps may be applied. A half hour or longer is spent in attempting to grasp the head with the high forceps, before the attempt is abandoned. Version is then tried,

but found to be too late, on account of retraction of the uterus, and embryotomy again is the method of delivery. Here, in trying to obtain a condition for the forceps, the condition for version was allowed to slip away. The time for version is limited, but the time for forceps is not.

In face labors with movable heads, prophylactic version is our ideal operation. If the minor operations succeed, well and good, but if they fail, keep the conditions for version present.

SECTION VI

Operations of Delivery

CHAPTER 19

Expression of the Fetus

KRISTELLER'S EXPRESSION

This is sometimes known as "Expressio Foetus," and consists in helping the delivery of the child by the application of pressure to the fundus of the uterus, thus increasing intra-abdominal pressure and stimulating uterine contractions.

Conditions—(1) The longitudinal presentation of the fetus.

(2) Ability to properly seize the uterus in the median line.

(3) There must be no inflammatory disease of the uterus or adnexa.

(4) There must be no threatened rupture of the uterus.

(5) Complete dilatation of the cervix, and no disproportion between the presenting part and the pelvis.

Indications—In cases having relaxed abdominal walls, with weak pains, expression is frequently very efficient. With a small fetus it may be of great value when there is an indication for immediate delivery. In delivery of the second twin expression is sometimes of assistance. Its greatest indication results when a pendulous abdomen permits a marked anteversion or anteflexion of the uterus. Here we frequently note that the head does not engage, although the uterus is contracting strongly and there is no disproportion between the presenting part and the pelvis. Under these circumstances, properly applied pressure upon the abdominal wall will cause the head to enter the cavity.

Technique—The fundus, having been separated from the surrounding organs, is seized by both hands during a contraction. The hands are so placed that their palmar surfaces point towards the pelvis, the thumbs anteriorly, and the other fingers close together on the pos-

terior uterine wall. Pressure is now madein the direction of the pelvis for from five to eight seconds, the pressure being gradually increased to an acme and then gradually relaxed, thus simulating normal uterine contractions. The intervals should last from one-half to three minutes. The attempt may be repeated from 20 to 30 times. Usually after 10 to 15 trials, a rest of 10 to 15 minutes is given. If, after 30 trials, no progress is made, the method should be discontinued.

HOFMEIER EXPRESSION

Hofmeier has recommended a method of pressing the head into the pelvis.

Indications—(1) After rectification of face presentations. (2) As a preliminary to high forceps. For examule: In certain cases of moderate contraction of the pelvis where the retraction of the uterus prevents version, and a high forceps or embryotomy are indicated, it is occasionally possible, by this type of expression, to force the head into the pelvis, thus manually engaging it and producing the condition for low or mid-forceps, with a much lower mortality.

Technique—The operator stands at the side of the well anaesthetized patient and placing the thumb over the occiput, and the remaining fingers over the jaw, the head is forced into the inlet. If the method succeeds, and it frequently does under the sudden pressure, the labor either ends spontaneously, or low forceps are applied.

Conditions—(1) The bladder must be empty. (2) There must be no thinning out of the lower uterine segment, and no threatened rupture of the uterus.

RITGEN EXPRESSION (MODIFIED)

Ritgen described the digital expression of the head from the outlet by the introduction of two fingers into the mother's rectum, these fingers by pressure causing extension of the fetal head, and its extrusion through the vulva. On account of the injuries to the rectum, and more important still, the great danger of sepsis which results from the contamination of the fingers used in the rectum, the method has been modified to include expression of the head by pressure on the posterior wall of the birth canal, behind the anus but not entering the anus.

Indications—(1) Its chief value lies in the delivery of the head between uterine contractions or under anaesthesia, during a normal delivery, or after removal of the forceps in a forceps delivery. Absolute control of the head may be maintained by this maneuver, and the percentage of lacerations materially decreased as a result.

(2) Arrest of the head at the outlet.

Conditions—From a practical standpoint, it is impossible to employ the modified Ritgen until extension has begun, and the large fontanelle may be palpated at the edge of the perineum.

Technique—Obstetrical anaesthesia should always be given at the beginning of the expression, and as soon as the head is under control the anaesthetic should be crowded to the surgical degree. The attendant, standing at the side of the delivery table, spreads his right hand (if he is on the right hand side of the table) so that the thumb lies on one side of the vulva, and the index finger on the opposite side, while his ring and other fingers, placed behind the anus, enable him to control very largely the head's advance. The head is held in the position desired first by pressure with the right middle finger through the perineum just beneath the forehead (Nasal notch) and later just behind the chin. By this pressure extension of the head is increased and it is slowly shelled out through the vulvar opening. The hand should be covered with a sterile towel, in order to prevent soiling from the rectum, this towel being discarded as soon as the head is born.

CHAPTER 20

Forceps Operations

The obstetrics forceps are instruments devised to extract the fetal head from the birth canal without injury to mother or child. As soon as the operation is conducted at the expense of the child it ceases to be a forceps operation and becomes a craniotomy. The ideal function of the forceps is traction only, all other functions, such as compression, rotation, or dilatation, producing unfavorable effects.

Description of Instruments—The forceps consists of two halves, each of which is divided into three portions,

i. e., handle, blade and lock. The halves are joined or articulated at the **lock.** The **handles,** by means of which the forceps are grasped, introduced or used during the operation, are found at one end of the instrument, while at the other end are the **blades,** which grasp the fetal head.

The forceps has two curves: the **cephalic curve,** which is intended to fit the convexity of the fetal head over the parietal regions, and the **pelvic curve,** which corresponds to the curve of the posterior wall of the pelvis, and is sometimes called the sacral curve.

The **left blade** of the forceps is the blade which is intended to be held in the left hand of the operator, and is applied to the left side of the maternal pelvis, while the **right blade** is held in the right hand, and applied to the right side of the pelvis.

The axis traction forceps is constructed and used to secure traction in the direction of the pelvic axis, and is invaluable in high forceps operations.

Kinds of Operations—Older classifications consider **low forceps,** when the presenting part rests upon the perineum, or lies below a line joining the ischial spines; **mid-forceps** when the head is engaged, but presents at the ischial spines; **high forceps,** when the head has partially descended into the pelvic canal, but is not engaged, i. e., its greatest circumference has not passed the superior strait; **forceps on the floating head,** when the head is freely movable above the pelvic brim. (Latter operation always contraindicated.)

From a practical standpoint, forceps operations should be divided into **high** and **low** types, since this classification will be sufficient to properly group indications, conditions and prognosis.

Conditions—(1) **The head must be engaged,** except in the high forceps operation. The head is engaged when the biparietal diameter has passed into or below the inlet. If the inlet is the smallest diameter of the pelvis, as in the flat pelvis, and the largest diameter of the head has passed through, the forceps are allowable and the operation is possible. On the other hand, if the pelvis is of the funnel-shaped type, and the outlet is very small, the head may be engaged and still delivery may not be possible. The engagement of the head, therefore, refers to the fact that the greatest bony resistance has been overcome. As marked contractions of the pelvic outlet are rare, we have the standard of

engagement as follows: If the head has passed to or below an imaginary line between the two spines of the ischii, the head is engaged. The caput should not be taken into account in determining the degree of descent. The head is also said to be engaged when it has covered the opper two-thirds of the sacrum and the upper three-fourths of the posterior surface of the symphysis publis. **Mobility, impaction or fixation have no reference to engagement,** as a movable head may be engaged, while frequently a fixed head is not engaged.

High forceps are only applied when the head has partially descended into the pelvis, and never to the floating head.

(2) **The cervix must be completely dilated.** It is always poor obstetrics to dilate the os with the forceps. Their function is traction, never dilatation. Forceps, uesd before the cervix is dilated, frequently result in deep lacerations that extend into the parametrium and cause a rupture of the uterus, with hemorrhage, shock and possible death of the mother. If the cervix is not completely dilated, and there is some indication for the rapid termination of labor, the forceps operation should always be preceded by a preparatory operation having as its object the artificial dilatation of the cervix. This operation might be a manual dilatatation, vaginal caesarian section, etc. **Never** apply the forceps through the undilated cervix.

(3) **The membranes must be ruptured.** This condition is easily secured. If the forceps are inserted before this condition is present, they will pass between the membranes and the uterine wall, and may cause a premature separation of the placenta.

(4) **The head must be neither too large, nor too small.** If the head cannot be delivered through the pelvis spontaneously because of its large size, as in hydrocephalus, or in a contracted pelvis, it is evident that the forceps only adds to the disproportion. The forceps should not be used on an anencephalic head, a small premature head, or one that is macerated, since the instrument will always slip in these cases.

It is very essential in the high forceps operation that the head should be moulded. In the more difficult cases due to a deformed pelvis or a large, hard head, a well moulded head is absolutely essential for the successful delivery of a living child. If the head is

unmoulded and there is an indication to deliver, version is preferable to high forceps. The best method to determine whether the head is moulded or not is to pass the fingers up to the head per vagina, and push the head up. The external hand now pushes the head into the pelvis. If the head comes to a stop suddenly, it is **not moulded**, while if it comes to a stop gradually, it is moulded. The degree of moulding can also be determined by the width of the sutures and the overlapping of the parietal bones.

(5) **The child should be alive.** As the forceps operation is always a life-saving procedure, and is always done at the expense of some injuries to the mother, we prefer to do the operation only when there is some hope of saving the child's life. If the child is dead, and there is an indication to deliver, craniotomy is the operation of choice. If there is uncertainty as to the condition of the child, it is always best to use the forceps.

Indications—(1) **Uterine inertia.** This is the most common indication for which the forceps are used, and is much overworked. Uterine inertia per se is not an indication for forseps, since it represents danger to neither mother nor child. The two most common sequellae of uterine inertia which are real indications for forceps are **maternal exhaustion**, diagnosed not upon subjective symptoms, but upon objective signs, such as elevation of temperature to 100, or over, and an elevation of pulse to 110 or 120, and **fetal asphyxia**, diagnosed by changes in rate and quality of the fetal heart tones, by the presence of meconium in a cephalic presentation, and by very active fetal movements during labor.

We make an arbitrary rule to apply forceps, **if the head is well engaged**, and the cervix completely dilated, and there has been no advance of the presenting part after 2½ hours of good second stage pains in a multipara, or 3½ hours in a primipara. The best efforts of the powers of labor are put forth during this time, and as a rule if this period is exceeded the danger of sepsis will be increased while the probability of a spontaneous delivery will decrease. The head should not be allowed to remain upon the perineum for more than one hour, without definite advance, since we know that after this period has elapsed edema of the perineum rapidly takes place, with greatly increased danger of extensive lacerations, sepsis, etc.

(2) **Deep transverse arrest of the head.** This is perhaps the second most frequent indication for forceps. The head is engaged, and rests on the tuberosities of the ischii with the sagittal suture in the transverse diameter of the pelvis. The head is usually extended. The condition itself does not indicate forceps, but the actual indication again results from fetal asphyxia, maternal exhausion or the arbitrary rule of non-advance in the second stage.

(3) **Complications of labor.** The most common complications which call for forceps are: Eclampsia, Acute and Chronic Cardiac disease, especially mitral stenosis; Acute and Chronic Pulmonary disease; Placenta Previa; Premature separation of the placenta; Prolapse of the cord when the conditions for the operation are present.

(4) **Forceps to the aftercoming head,** when, in a breech delivery, or in the extraction following a podalic version, it is found impossible to deliver the aftercoming head in the eight minute period.

Advantages, Forceps over Version—The forceps operation has four advantages over version:

Forceps	vs.	Version
May be done at any time during second stage, if head is accessible.		Impossible after retraction of the uterus has occurred.
No danger of asphyxia after forceps operation completed.		After version must undergo the dangers of breech extraction.
The head can be drawn through the pelvis with axis traction forceps, without waste of force.		The aftercoming head cannot be delivered in the axis of the inlet, because traction on the body pulls the head against the os pubis, and therefore greater force is used than is necessary in order to deliver.
No time limit for passage of head through the pelvis, in favorable cases.		Extraction of head must not take more than eight minutes, hence injuries to mother and child are more common.

Choice, Forceps vs. Version and Extraction—The conditions present must always determine which operation is to be done.

(1) If the head is engaged the forceps are preferable to version. It must be remembered that engagement and fixation are not synonymous terms, and frequently a fixed head becomes freely movable under anaesthesia, and version may be indicated.

(2) In cases of malposition at the pelvic brim, i. e., face, brow, occiput posterior, anterior or posterior parietal presentation, version is preferable.

(3) In a primipara, other things being equal, forceps are preferred to version, on account of the danger of extensive lacerations, and the extremely high fetal mortality of version in this type of cases.

(4) If the membranes have been ruptured for several hours, and retraction of the uterus has taken place, version must not be performed, on account of the danger of rupture of the uterus. In these cases, if the head is not engaged, artificial engagement by Hofmeier's expression, with application of high forceps, is indicated.

(5) In a general way, the forceps operation is safer than version.

(6) If the head is movable, in or above the brim, version is preferable.

(7) Forceps are never indicated except in cephalic presentations, except that they may be properly applied to the aftercoming head in breech presentations.

Principles in the Application of Forceps—It is necessary in all forceps operations to have the pelvic curve of the instrument correspond with the pelvic axis. There are two applications of the forceps—cephalic and pelvic. In the **cephalic application** the forceps blades are applied to the sides of the fetal head, overlying the parietal bones, while in the **pelvic application** the forceps blades are applied with reference to the sides of the maternal pelvis, irrespective of their application to the fetal head. Only when the sagittal suture is in the antero-posterior diameter of the pelvis, can the forceps be applied so that its cephalic curve and pelvic curve correspond to the curve of the biparietal diameter of the fetal head and the curvature of the pelvic axis respectively. The cephalic application is our method of choice in all cases, since deflexion of the fetal head, extensive injuries to the fetus, and to the mother, are more apt to follow the pelvic

application than the cephalic. **The front of the forceps** is the concave side of the pelvic curve, i. e., the side to which the tips of the blades point.

The point of direction is that portion of the presenting part which temporarily approaches, or ultimately comes under the pubic arch. The point of direction is the occiput, if the occiput lies in the transverse diameter of the pelvis, or anterior to it. When the occiput lies in the posterior quadrant, the forehead becomes the point of direction. If both occiput and forehead lie in the transverse diameter, the occiput is the point of direction by preference. Therefore, in a vertex presentation, the occiput only ceases to be the point of direction, when it lies posterior to the transverse diameter. A rule to which there are no exceptions is that **the front of the forceps must face, or point, toward the point of direction.** Thus if the occiput lies between the transverse diameter and the symphysis pubis, the front of the forceps should be directed midway between the anterior and transverse, or at an angle of 45 degrees from the transverse diameter. Again, if the diagnosis is a left deep transverse arrest (L. O. T.) the occiput is the point of direction, and the front of the forceps points to the left and anterior. (See "Forceps in deep transverse arrest.")

Technique—Low and Mid-Forceps. The patient is surgically prepared, under deep surgical anaesthesia, upon an operating table. The steps of the operation are as follows:

Catheterization, since a full bladder will interfere with the mechanism of delivery, and predisposes towards the extension of lacerations of the lower uterine segment.

Examination, under anaesthesia, to determine accurately the position of the presenting part. It is best to introduce the entire hand into the vagina, unless the head is on the perineum, and by palpation determine exactly the conditions present. The most common condition that may cast doubt upon our diagnosis is a large caput succedanum. If palpation of the sutures and fontanelles does not give sufficient data, it is best to pass the hand along the head until an ear is felt. The location of the ear tells us definitely in which diameter of the pelvis the sagittal suture lies. Thus, for example, if the ear is felt under the os pubis, we know that the head lies transversely; if the ear is felt

in the transverse diameter of the pelvis, the sagittal suture is in the antero-posterior diameter. It is also possible to tell by the palpation of the ear, where the occiput lies. As the fingers pass over the ear, the fingers press the lobe over the auditory meatus, and when the pressure is released the lobe springs back into place and a distinct "flop" is noticed by the examiner. The lobe always flops in the direction of the occiput.

Application of the blades. Four fingers of the right hand are passed along the left and posterior wall of the pelvis, within the cervix and membranes, and along the side of the fetal head. The **left blade** of the forceps, held in the vertical position with the left hand, is first introduced. A **posterior introduction** of the forceps blade is advisable. The tip of the left blade is inserted along the lateral wall of the pelvis, but follows the hollow of the sacrum or the postero-lateral wall. It passes along the palmar surface of the hand, and is guided to its proper position about the curvature of the fetal head. **No force** should be used in the introduction and application of the blades. As the left blade disappears within the genitalia the handle is depressed, and the blade is then brought to the desired position on the head by the aid of the inserted fingers of the right hand, aided by pressure with the right thumb. The **right blade** is now applied in a similar manner.

Adaptation or Locking. If the blades lie laterally, on the head, locking is easy. Locking of the blades may be prevented by the shoulders coming between the tips, by something lying between the blades and the head, or by tumors, malpositions, etc. If locking does not succeed, we press the handles downwards toward the perineum and try to lock. If this fails we press downward and inward. If locking is still impossible, it is best to reintroduce the entire hand into the vagina, and endeavor to secure a better application by gentle pressure on the blades and twisting of the handles. A poor application is the usual cause of difficulty in locking. It may be necessary to remove the blades, and re-apply. **Use no force in locking.**

Trial traction—The first traction is called the trial traction, and is made to determine whether the head will follow the forceps, whether the forceps will slip, and the necessary amount of force to be used in the extraction. The minimum amount of traction should be

used at first, lest the head be extracted by the first traction, and the perineum lacerated. During the trial traction one hand grasps the handle of the forceps, while two fingers of the opposite hand are passed up to the head, in order to determine advance, slipping, etc. Before traction, **always** examine to see that the forceps lie on the head, and entirely within the cervix. Also see that there is no prolapse of the cord, arm or foot.

Slipping of the forceps is due to either (1) Faulty application, (2) Error in the direction of traction, or (3) Attempted extraction in the presence of great obstruction.

Extraction—Traction should imitate labor pains, and should be made at intervals of from one to three minutes. Each traction should last from 15 seconds to one minute. The maximum force should not exceed 60 pounds. No twisting or pendulous motions should be attempted, as they are always done at the expense of maternal and fetal injuries. Ordinarily the right hand is placed on the lock, with the left hand just below and both thumbs on the posterior surface of the handles. The elbows should be held close to the body, and all **bracing prohibited.** The direction of traction is determined by the position of the head, the handles pointing downward and forward when the head is high, and gradually rising as the head descends. The direction of the handles between pains is a good indication in which the next traction should be made. Traction should be made downward until the occiput is brought below the pubic arch. As the head is being born by extension, traction is upward, approaching and passing the perpendicular. During the intervals between tractions the blades should be unlocked, to relieve the fetal head from continuous pressure.

Removal of the blades—As soon as the head has been brought sufficiently low in the parturient canal to allow its further delivery to be accomplished by the modified Ritgen's expression, the blades should be removed. This is best, for two reasons:—first, because even the thin blades of the forceps occupy a certain amount of room, and their absence diminishes the tension to which the vulvar outlet is subjected; and second, because the head can usually be delivered more gradually, and under more perfect control by the hands than by the forceps, and hence laceration may be avoided by removal of the blades before the complete

delivery of the head. From the practical standpoint, the blades are best removed when the anterior fontanelle can be palpated just outside of the edge or rim of the perineum. This is noted at the same time that the parietal eminences are felt by the protecting hand, through the perineum. As soon as the blades are removed, the head is delivered by Ritgen's Expression (modified).

Practical applications—The **fetal heart tones** should be carefully noted at the beginning of the operation. The condition of the fetal heart gives us the length of time allowed for the operation, providing the mother is in good condition. If fetal asphyxia is threatened we must make a rapid extraction, while otherwise we can extract slowly in order to save the perineum. Auscult heart tones frequently during operation. The **maximum time allowed** for the forceps operation is one hour. If the operation cannot be completed in this time, the attendant has evidently undertaken the operation before the proper conditions were present. In the anterior positions of the vertex presentations, i. e., L. O. A. and R. O. A., the forceps are applied to the sides of the fetal head, the front of the forceps pointing towards the point of direction, the occiput.

Forceps in deep transverse arrest—In this condition, a true cephalic application is impractical, since in "The Principles in the Application of Forceps" we noted that it is necessary, in all forceps operations, that the pelvic curve of the instrument corresponds with the pelvic axis, and if the blades are applied to the sides of the fetal head the curve of the anterior blade is directly opposed to the curve of the pelvic axis, and is likely to cause extensive injuries to the bladder and anterior vaginal wall.

In a deep transverse arrest the forceps are applied obliquely to the head, so that the blades rest over the posterior parietal, and the anterior malar bones. If the diagnosis is a left deep transverse arrest, L. O. T., the occiput is the point of direction, and the front of the forceps points to the left and anterior.

The left blade passes up along the left posterior quadrant, guided by the fingers, until it falls into position over the posterior parietal bone. The front of this blade already points to the left and anterior, and as the law of application holds, it is not necessary to adapt the blade.

As the right blade is passed into the pelvis, along the right posterior quadrant, the front points to the right, and away from the point of direction. This is contrary to the rule, and the blade requires adaptation. The blade should be gently passed along the right wall of the pelvis, aided by the fingers of the examining hand, and passed over the fetal face until it lies over the anterior malar bone, when the front of the forceps will point to the left and anterior, i. e., toward the point of direction. Both fronts must be parallel before they will lock. If they will not lock, the blades are gently manipulated until the fronts are parallel and point in the right direction. In adaptation it is always best to move the blades only under the guidance of an examining hand.

In deep transverse arrest, the fronts never point directly anterior, nor do the handles come together. The more perfect the application to the sides of the head, i. e., over the parietal bones, the closer will the handles come together. A distinction should be made between the coming together of the locking portion of the handles, and the coming together of their entire length.

Rotation of the head usually occurs after a few tractions. The head usually rotates in the grasp of the forceps blades. As soon as rotation occurs, the blades should be re-adapted, in this case to the sides of the head, since the position has now become an L. O. A., and the delivery accomplished as described under low forceps.

Forceps in posterior positions of the vertex—The attendant will usually have a partial posterior rotation, in which the occiput lies between the coccyx and the transverse diameter of the pelvis, but occasionally will be confronted with a case in which complete posterior rotation has occurred, and the occiput lies over the coccyx. Anterior rotation per se should never be attempted, since as a rule the head can be more safely and successfully delivered with the occiput posterior. In a majority of cases the occiput will rotate anterior spontaneously, in the grasp of the forceps, as soon as the pelvic floor is reached.

The best method of delivering an occiput posterior with forceps is by the application of **Scanzoni's maneuver**, known as the **double application of forceps**. Before Scanzoni's maneuver is attempted, the following conditions are necessary: (1) An exact determination

of the position of the head. The worst possible results will follow mistakes in diagnosis of posterior positions. (2) The head must be so situated that cephalic application is possible. While it is possible to do this application with the ordinary forceps, the use of the Tarnier axis traction forceps will give better results. With these forceps, there is no force wasted, and there is no interference with normal rotation. The traction apparatus is used until rotation has occurred, and the second application is made. The author strongly recommends the Tarnier instrument in this class of cases.

First application. Since the occiput lies posterior to the transverse of the pelvis, the forehead is the point of direction. In a right occiput posterior, R. O. P., the front of the forceps will point to the left and anterior. The blades are applied to the sides of the child's head, as though the position were an L. O. A. Trial traction is made without attempting rotation, in order to determine the natural rotation. If, under simple traction, the occiput is found to rotate posteriorly, the head is delivered in that position. If the occiput rotates anteriorly, the forehead is the point of direction only until the occiput has reached the transverse diameter of the pelvis. The point of direction now changes, since we have seen that if both occiput and forehead lie in the transverse diameter, the occiput is the point of direction by preference, and hence the front of the forceps must point to the right and anterior. This will necessitate a re-application of the blades.

Second application: It is usually best to change the blades by a complete removal and a re-application, but occasionally it is necessary to change them in situ. If the head is movable, when the blades are taken off, it may return to its former position, and necessitate a repetition of the operation. In such a case, it is best to adjust the blades in situ. The occiput being to the right and transverse, R. O. T., the left blade is applied over the posterior parietal, and the right blade over the anterior malar, as outlined under "Forceps in deep transverse arrest." The operation now proceeds as in deep transverse arrest. From a practical standpoint, it is usually possible to delay the second application until the occiput has rotated farther anterior, and the case has become an R. O. A. In this case the forceps will be inverted when the second application is to be

made. The author prefers this method, although it does not conform strictly with the rule.

If the occiput fails to rotate anterior, the forehead remains as the permanent point of direction. Traction is made downward until the forehead comes to rest firmly against the pubic arch. The handles are now raised upward, and the occiput delivered over the perineum. The head is finally delivered in forced deflexion, the handles being lowered without traction, as soon as the occiput is delivered. There is great danger of laceration of the perineum, and an episotomy is usually indicated.

Forceps in face and brow presentations—The forceps are to be used in face presentations only when the head is in complete extension, and has descended into the cavity of the pelvis. Forceps are only used after anterior rotation has taken place, and the chin is the point of direction. In a face presentation it is best to use the Tarnier axis traction instrument, with the traction bar, unless the chin has rotated beneath the symphysis. Artificial anterior rotation of the chin is a dangerous and very difficult procedure, and in order to obtain the best results, an instrument must be used which will mechanically favor rotation. Cephalic applications are always advisable.

In a left mento anterior, the chin is the point of direction, and the front of the forceps will point to the left and anterior. In closing the forceps, care must be taken that the handles are not depressed as in a vertex presentation, but are somewhat elevated, so that the tips of the blades grasp the occiput. During extraction traction is made upward until the chin is born beneath the symphysis. Care must be taken not to press the throat against the symphysis, thereby causing edema of the pharynx or glottis, and possibly fatal asphyxia neonatorum.

Through further elevation of the handles of the forceps the occiput is delivered over the perineum, as the head passes from extension into flexion.

Forceps to the aftercoming head—While in the great majority of breech labors, the head can be delivered manually, the forceps are at times a valuable aid in accomplishing the extraction. It is well to have the forceps sterilized in every case of breech, or of podalic version. They will rarely be needed, but when required there is no time to prepare them for use. The operation is necessarily a rapid one, and is done when

the other methods of delivery of the aftercoming head have proved unavailing and the child is still alive.

If the **occiput is anterior**, the body of the child is raised by an assistant or nurse, and the blades are applied beneath the body, to the sides of the child's head, along the occipo- mental diameter, the chin being near the lock and the pelvic curve of the instrument being directed towards the back of the fetal neck. With the patient in the dorsal lithotomy position, traction is made forward and upward, the mouth, nose, eyes and forehead sweeping over the perineum as the back of the child is raised and approaches the mother's abdomen.

If the **occiput is posterior**, the blades are introduced anterior to the body, a cephalic application being made. Flexion of the head should be obtained if possible. Traction is made downward until the forehead stems the os pubic, when the handles are raised and the occiput delivered over the perineum.

Forceps to the breech—Always contraindicated.

High Forceps—The higher the child's head lies in the pelvis, the more difficult and unscientific is the use of forceps. As already stated, the application of forceps to the floating head is absolutely contraindicated. By high forceps we mean the application of forceps to the head which has entered the pelvic inlet, but is still unengaged. We must again emphasize the differentiation between engagement and fixation. These terms are usually confused, but have nothing in common.

Instrument: The Tarnier axis traction forceps were invented by Tarnier to enable the accoucheur to make traction on the head, in the axis of the inlet. With the short forceps it is impossible to depress the handles sufficiently to enable one to pull in the right axis, and consequently the presenting part is forced anterior, against the symphysis, and more force is used to deliver than in necessary if the force is properly directed. When the axis traction instrument is applied, it becomes a part of the head, and the handles indicate by their position the direction in which traction is to be made.

Pajot's Maneuver: In order to avoid the mechanical defects of the low forceps instrument, Pajot recommended that the operator press down on the lock of the instrument with one hand, and push up on the handle with the other hand. In this way the head

would be pulled around the pubic arch, instead of against it. This maneuver gives good results where an axis traction instrument is not available. This maneuver may result in horizontal slipping of the blades.

Indications: The consensus of opinion among American obstetricians is that the high forceps operation is very rarely, if ever, indicated, on account of its high maternal and fetal mortality. In the presence of an absolute indication to deliver, either on the part of the mother or child, if the conditions are present, the operation has a definite, but very limited field.

Conditions—The usual conditions for forceps must be present, and one additional condition, i. e., the head must be moulded.

Alternatives to high forceps: Hebosteotomy, version and extraction, celiohysterotomy and embryotomy must be considered as competitors to high forceps. Hebosteotomy at present is being performed in certain clinics, to the exclusion of all other obstetric procedures. While in selected cases this operation may be performed, even after a trial with high forceps, yet conservative obstetricians are not as a rule in favor of the operation. The dangers have been discussed. (See Hebosteotomy.)

Version and extraction occasionally compete with high forceps, if the membranes have but recently ruptured, the presenting part is movable and there is no threatened rupture of the uterus. The maternal mortality is lower than high forceps, and the fetal mortality depends upon parity, type of pelvis, and mobility of the fetus. Version is very dangerous in a generally contracted pelvis, and as a rule should not be performed on a primipara. (There are exceptions to this.)

Abdominal Caesarian section is preferred to high forceps in a clean case, since the maternal mortality in high forceps is about 4%, and Caesarian 3 to 5 %; and the fetal mortality in high forceps is 40 to 80%, and in Caesarian section nothing, if the child is alive at the time of operation. The disadvantage in doing an abdominal Caesarian section instead of a high forceps, and this applies particularly to a primipara, lies in the fact that if a policy of strict watchful expectancy is followed, the indication for interference will frequently not arise until after the time for a Caesarian section has passed. If this policy is not followed, and a Caesarian section is performed before there is any scientific indication for interference, many operations will be

performed upon cases which would otherwise deliver spontaneously.

If the high forceps operation is unsuccessful, Caesarian section is contraindicated, and embryotomy should be performed. It must be noted that embryotomy usually indicates faulty management of the case, i. e., the attendant has allowed the time for elective life saving operations to pass.

Technique: A high forceps should always be considered a tentative procedure. By Carl Braun's **operation of diagnosis** we mean the application of high forceps, followed by eight tractions, to determine the real extent of the disproportion between the head and the pelvis. If after eight tractions the head is not engaged, the operation of high forceps is contraindicated. The use of the Walcher position during this trial operation is particularly indicated.

A cephalic application is made, following the rules for application of forceps. After adaptation the blades are locked with the thumb screw of the French lock. The compression screw lying on the anterior surface of the shank, just in front of the handles, should be used only to maintain the amount of pressure of the blade upon the head, which is given by the obstetrician when the hands grasp the handles during traction. It should not be used for compression.

The traction rods are now unsnapped from their holding pins and the cross bar handle adjusted to them. Traction is made upon the cross bar in such a way that the traction rods are parallel to, and just below, the regular handles, i. e., the **traction rods are to be kept 1 centimeter** distant **(below) the lock.** As soon as the head is brought down to the perineum, the cross bar is disconnected, traction rods snapped upon the holding pins, and the delivery completed as described under low forceps. While using the traction apparatus, the handles are not to be touchced, but all traction is made upon the cross bar, as outlined. **This is important. No forceps operation should last over one hour.** If the attendant is unable to deliver without great effort, it is best to stop the forceps operation, and choose other means of delivery. Living children are seldom if ever delivered after prolonged and difficult forceps operations, and it would seem unwise to subject the mother to the dangers of such operations, for the sake of a dead baby.

Dangers in forceps operations—Maternal injuries, such as lacerations of the cervix, extending even into the parametrium; perforation of the vaginal vault into the peritoneal cavity; lacerations of the vagina involving the pelvic floor; injuries to the large nerve trunks or plexes, resulting in temporary or permanent paralyses; lacerations of the perineum extending even into the rectum. Following such injuries the patient may die of hemorrhage or sepsis. Fistulae are not uncommon sequences.

Fetal injuries, such as marks of the forceps over the face and scalp; injury to the facial nerve at its exit form the stylo-mastoid foramen; tearing off of an ear; injuries to eyes, cord, extremities; skull fractures; entrance of the forceps blade beneath the scalp.

These dangers are usually the result of unusual force, prolonged operation, or faulty application of the forceps. If the indications for forceps are clear, and the conditions are present, the operation is not difficult and the results are good. On the other hand, if the operation is done as a matter of convenience, and without regard to scientific indications, or conditions, disastrous results will usually follow.

CHAPTER 21

Cesarian Section

CAESARIAN SECTION (CELIOHYSTEROTOMY)

Definition—Caesarian section is an operation performed at the expense of the mother, primarily in the interests of the child, but occasionally in the interest of both mother and child. The term refers to the delivery of the child by celiotomy. By **conservative Caesarian section** we mean the simple delivery of the child by the abdominal route, and the conservation of the uterus. This is the usual operation. By **Porro-Caesarian section** the delivery of the child is followed by supravaginal amputation of the uterus. This term is occasionally extended to embrace complete hysterectomy following Caesarian section. **Extra-peritoneal Caesarian section** signifies the delivery of a child by opening the uterus through the lower uterine segment, from which the peritoneum has been pushed up. The object is to avoid entering the abdominal cavity, on account of the danger of infection.

Indications—(1) **Absolute Indication.** If the conjugata vera measures under 5½ cm. in the flat pelvis, or 6 cm. in the generally contracted type. A bi-ischiatic measurement of 5½ is also classed as an absolute contraction. In a pelvis having these measurements it is impossible to extract a full term fetus, either intact or mutilated. Absolute indication is also occasionally presented by tumors, certain fixed malpositions of the fetus, etc.

(2) **Relative Indication.** A relative indication exists when, even though the child could be delivered through the natural passages, Caesarian section offers greater safety to mother and child. (a) **Relative contraction** of the pelvis. In this case the pelvis is sufficiently large to permit the passage of the mutilated fetus, but in order to deliver a living child, with the least danger to the mother, Caesarian is chosen. (b) **Eclampsia.** Abdominal Caesarian is only chosen when the case presents a long, non-effaced, non-dilated cervix, which cannot be manually dilated without great loss of time, and danger to the mother. It is very rarely indicated in a mutipara.

(c) **Central placenta previa.** When the patient is at or near term, in good condition, and when hospital facilties are available, I believe Caesarian section offers the best chance for both mother and baby. It should not be done upon an already exsanguinated patient. (d) (d) **Abruptio placentae.** In premature separation of the placenta, with long, rigid cervix, Caesarian is indicated, if the patient is in good condition. (e) **Previous Caesarian section.** Since there is grave danger of rupture of the uterus at the site of a Caesarian section scar, one Caesarian should always be an indication for another.

When considering the relative indications for Caesarian section, the accoucheur must remember that there are many cases in which it is impossible to predict, prior to the onset of labor, whether the patient will be able to deliver herself unaided, or with the use of forceps. Much depends upon the strength of the uterine contractions, and upon the moulding of the fetal head, that nothing but the test of labor will determine. In borderline cases, in the first pregnancy, the woman should be given the test of labor to see if she is not able either to deliver herself spontaneously, or at least

to bring the presenting part within the range of the forceps operation.

The physician must also consider the necessity of repeating the procedure in future pregnancies.

Conditions—(1) Hospital environment is essential.

(2) The case must be a clean one, i. e., the patient should not be exhausted by a long labor; should not have been examined within 48 hours of the time of operation; the membranes should not be ruptured, or at least only very recently ruptured, at the time of operation. It is to be noted that one or perhaps two, vaginal examinations, prior to operation, do not necessarily contraindicate the operation if the examinations have been made under the proper conditions, i. e., rubber gloves, patient shaved, scrubbed, and so forth.

(3) The child should be alive, and in good condition. (Except in absolute contraction.)

Time of Operation—An elective Caesarian section is best done from a few days before, to a few hours after, the onset of labor. Personally, I prefer to allow the patient to go into active labor, since it is seldom possible to accurately determine the actual period of pregnancy.

Competing Operations—(1) **Premature labor.** This requires the opportunity to induce labor at about the thirty-fourth week. If the case is seen later in pregnancy, and induction is performed, it is frequently necessary to deliver artificially, and many babies are lost. Premature babies do not stand the trauma of labor well, and the operation has a large mortality. It is usually more satisfactory to allow the case to go to full term. If after a test of labor, she is unable to engage the head, Caesarian section will give excellent results, both for mother and child.

(2) **Pubiotomy.** Here again, we have a procedure which is not absolute in its scope. If the patient goes to full term, and a pubiotomy is decided upon, the attendant cannot be sure that the delivery of an intact living fetus will be possible even after the severing of the pubic bones. In addition to the uncertainty of the outcome to the fetus, he is aware of the many complications which may follow the operation. I do not recommend pubiotomy.

(3) **Embryotomy** is to be considered when the conditions of mother and child are unfavorable. The actual mortality is 0% for the mother, whereas in the hands of ordinary operators, in unfavorable cases, the mortality of Caesarian section averages 10%. If the

fetus is dead or dying, or is a monster, embryotomy is to be preferred. If the mother is exhausted or infected, it is far better to do a craniotomy on the present child, and do an induction of labor, or a Caesarian section, in the next pregnancy. If the woman cannot be taken to a hospital, or if the attendant is inexperienced in abdominal surgery, embryotomy is the operation of choice.

(4) **High forceps** have in the last few years come into active competition with Caesarian section. If the patient is in good condition, and the head is not engaged, Caesarian section, with a mortality of 3 to 5% of the mothers, and 0% of the babies, gives a better chance than high forceps, with a minimum maternal mortality of 4%, and a fetal mortality of from 40 to 80%.

Techniuqe: Celiohysterotomy. Preparations. The patient is surgically prepared, and completely anaesthetized. Ether is the anaesthetic of choice. Just before starting the anaesthetic a hypodermic of aseptic ergot is given.

(1) **Abdominal incision.** I prefer the "high incision" as advocated by Davis, of the New York Lying-in Hospital. The incision should be 10 cm. (4 inches) in length, and its lowest point should be just above the umbilicus. The advantages of the high incision are: First, it minimizes the danger of adhesions between the uterus and the abdominal wall, since after the uterus is sutured and returned to the abdominal cavity, the uterine scar and the abdominal scar are not in apposition, and hence are not likely to unite. Second, there is less danger of a hernia, since the pressure in the upper abdominal quadrants is less than in the lower. This is important, on account of the marked thinning out of the abdominal wall, due to pressure of the gravid uterus, and the resulting difficulty in "sewing up." As the belly wall is very thin, the operator must be very careful in order to avoid entering the abdominal cavity with the first stroke of the knife. It is best to make a small opening, and enlarge with scissors.

(2) **Uterine incision.** It is best to pack off the intestines with a five-yard pack, or with two or three towels. The object of the packing is to keep the intestines out of the field, and to prevent any needless soiling of the peritoneal cavity with liquor amnii and

blood. The uterus is pushed into the median line by an assistant, and opened with a scalpel. The uterine incision should be down to the membranes or placenta, if possible, but if the operator opens up the amniotic cavity, there is no harm done. The uterine incision is now extended with the scissors, until it corresponds in length and location with the abdominal incision. If the membranes have not been ruptured, the operator will find it a distinct advantage, at this time, to pass his hand into the uterus, between the membranes and the uterine wall, and completely separate membranes and placenta from the uterine wall.

(3) **Extraction of child.** The operator's hand now seizes a leg, and rapidly extracts the child. The child is passed to the assistant, who clamps the cord in two places, cuts between the clamps and drops the child into a sterile blanket, held by a nurse or assistant. The child should be removed from the operating room, and resuscitated, if necessary, by an assistant assigned to that task.

(4) **Removal of placenta and membranes.** After the operator passes the child to the assistant he grasps the uterus at the upper angle of the uterine incision, and draws it out of the abdomen. The placenta and membranes are now removed manually. It may be necessary to wipe out the cavity of the uterus with a gauze pack, in order to remove small bits of adherent membranes. One ampoule of pituitrin is now injected directly into the uterine muscle, with a surgically clean hypo, and a hot sterile towel is packed into the uterine cavity, the uterus being massaged to promote contraction, and to control hemorrhage.

(5) **Suturing of uterine wound. Deep interrupted sutures,** of No. 2, chromic catgut, threaded single, are introduced through the peritoneum, very close to the cut edge, and are passed deeply into the muscle, to the endometrium. They should be placed at about one centimeter intervals (3 to an inch). The towel, which has been placed in the uterine cavity to promote contraction, is removed before the last sutures are tied. A **Lembert suture** (continuous button-hole) of No. 1 plain catgut will draw the peritoneum over the uterine wound.

(6) **Sterilization of the patient.** Since the performance of one Caesarian section is an indication for a repetition of the operation if a subsequent pregnancy

takes place, I believe that the right of decision should be conceded to the mother and her family. If there are no living children, it is best to carefully explain the safety of future sections, and the possibility of the death of the only child. At the second Caesarian sterilization should be willingly performed, if requested.

Technique: At least one inch of the uterine end of each tube is resected, together with a wedge-shaped piece of uterine horn, containing the tube. The cut surface is whipped over with No. 1 plain catgut. (Continuous.)

(7) **Abdominal wall** is sutured in the usual manner, taking great pains to isolate and properly approximate the fascia.

Practical Applications—Disregard entirely the old methods for the control of hemorrhage, such as ligature about the lower uterine segment, pressure upon the uterine arteries in the broad ligaments, etc. Do not eventrate the uterus, on account of the surgical shock which frequently follows great traction upon the peritoneum.

Operate slowly and carefully. There is no more reason for extreme haste at any stage of this operation, than in any other laparotomy.

If the cervix is not dilated, it is not necessary to di late from within. If you have removed the secundines completely, the drainage will be sufficient.

In suturing the uterus, a Mayo surgeon's needle, taper point, square eye, half circle, size 1, should be used. (Kny-Scheerer No. B-6495.)

Be gentle. Use no retractors, and handle the abdominal viscera as little as possible.

After-care—(1) **Posture.** Receive in warm bed. Dorsal position until patient is out from anaesthetic, then **Fowler position** for 48 to 72 hours, or longer in the presence of temperature. The patient may turn from side to side.

If the temperature is normal, the patient may be **lifted** in a wheel chair on the fourth day after operation, and may remain up until tired. This may be repeated daily. I usually allow patient to take a few steps on the tenth day, and be about on the twelfth day.

(2) **Drop method,** using tap water, is begun as soon as the patient is returned from the operating room, and is continued for 48 to 72 hours.

(3) **Diet.** The patient is given small amounts of warm water or warm tea, as soon as she asks for them. **No ice or iced drinks** are given. Liquid diet is continued until the bowels move. Light diet begins when bowels move, and continues for 48 hours, when patient is placed upon regular diet.

(4) **Pain.** Heroin, by hypodermic, is given in a dose of from 1/24 to 1/12 grain. This drug can be pushed to its full physiological effect, and sufficient should be given to control pain.

(5) **Bowels.** A low, soap suds enema, is given at 4 or 5 P. M. preceding the second midnight following operation. At midnight one ounce of castor oil or 2 Barker's Post-partum Laxative Pills are given, to be followed in 6 or 8 hours by a low enema. For example: Operation, Tuesday, 10 A. M. Low enema at 4 P. M. Wednesday afternoon, castor oil Wednesday night, enema Thursday morning. Intestinal paresis is the most common complication following Caesarian section. The above routine has given me the best results. It is followed by the administration of Ext. Cascara, 10 grains, 3 times a day.

(6) **Gas.** In the order of their value: **A.** Enema, (upper sigmoid) of 6 ounces of warm glycerin. **B.** Colon tube. **C.** So-called 1-2-3 enema. Formula is Turpentine, 1 dram; Magnesium sulphate, 2 ounces; Glycerin, 3 ounces; Water sufficient to make 16 ounces. D. Eserine, 1/50 grain, by hypo, every hour for three doses.

Peristalltine, a glucoside derived from cascara, is marketed in ampoules for hypodermic use. It may be of value.

(7) **Drugs.** It is a good routine order to give Extract of Piituitary gland, 1 ampoule by hypo four times a day for one day. This is followed by Fix. Ergot, ½ dram four times a day for five days. This will promote involution and in my opinion decrease the danger of infection.

(8) **Nursing the baby.** The baby is put to the breast in from 12 to 24 hours after delivery, and thenceforth as in a normal case.

PORRO-CAESARIAN SECTION

Indications—(1) The same as for conservative Caesarian section, in cases in which infection is present, or contamination has occurred which renders infection prob-

able. (2) Osteomalacia. In this case the ovaries are removed, in order to control the disease.

(3) Uncontrollable hemorrhage occasionally occurs in a conservative Caesarian section, which may be best treated by extirpation of the uterus.

Technique—The technique is the same as in the classical Caesarian section, except that in infected cases it is best to eventrate the uterus, and prevent spilling of the infected contents into the abdominal cavity by means of a sterile rubber sheet, which is so placed that the abdomen is walled off. After delivery of the child, the ovarian and uterine vessels are secured and the uterus is amputated at the junction of the upper and lower uterine segments. The peritoneum is sutured over the stump, and the abdomen closed without drainage. Note: The original description, by Porro, advised the amputation of the body of the uterus and adnexa above an elastic ligature placed about the cervix, and the anchoring of the stump in the lower angle of the abdominal wound. This is obsolete, having been superseded by the modern supra-vaginal amputation, as described.)

EXTRAPERITONEAL CAESARIAN SECTION

Definition—Extraperitoneal Caesarian section is an operation performed without opening the peritoneal cavity. This has been devised in order to avoid the high mortality of the classical Caesarian section when performed upon a patient already infected, and as a substitute for the classical section.

Types—Two methods have been devised. First, the transperitoneal (Frank and Hirst operations), in which the peritoneal cavity is opened, the uterovesical fold is separated from the bladder and lower uterine segment, and is stitched to the parietal peritoneum. The general peritoneal cavity is thus walled off, the uterus is opened and the child delivered, "through a fistula" between the uterine cavity and the skin. Second, the true extraperitoneal method (Latzko and Doderlein operations), in which the incision in the lower abdominal wall is carried through muscle and fascia to the peritoneum, but not through it. The peritoneum is then dissected from the lower uterine segment, the bladder displaced to one side, uterus opened, and the child delivered. This is the operation of choice, since in the transperitoneal method there is great danger

that peritoneal lacerations will occur, with subsequent soiling of the abdominal cavity.

Summary of Technique (Latzko Type)—(1) The patient is in the Trendelenburg position. A Pfannensteil incision is made, and the space of Retzius is exposed.

(2) The bladder, which has been distended at the beginning of the operation, is exposed and after its attachments on the left are separated, it is pushed to the right side.

(3) The fold of peritoneum of the vesico-uterine pouch is stripped upward from the lower uterine segment.

(4) A longitudinal incision in the lower uterine segment is made, avoiding the peritoneum above and the ureter below. (Note that on account of the displacement of the bladder to the right, the left ureter may be in the field.)

(5) The head is delivered with forceps, the placenta and membranes removed at once, and the wounds carefully sutured, with or without drainage, according to the probability of infection before operation.

Relative Value, Extraperitoneal and Conservative Types—On account of the difficulties in technique, and the frequency of such complications as injuries to the bladder and ureter, accidental opening of the peritoneal cavity during the dissection of bladder and peritoneum from the lower uterine segment, extensive cellulitis of the subperitoneal connective tissue, the operation has not met with favor in America. **In non-infected** cases the conservative (or Sanger, as it often called, after Sanger, who first described the modern method) operation has an extremely low mortality, can be more rapidly performed and is open to none of the objections to the extraperitoneal type. **In the infected cases,** it is questionable as to whether this type of operation will reduce the mortality materially, and it is usually best, if there is an absolute indication for operation, to do the Porro operation.

POST-MORTEM CAESARIAN SECTION

The child will live from 5 to 20 minutes after the death of the mother. This period varies with the cause of maternal death. Thus if the mother's death was sudden, as from an accident, the child will live longer than if the mother had been ill for some time.

That the operation of post-mortem Caesarian section was legal without consent was shown by Bacon (Trans.

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Chic. Gyn. Soc. 1911). He pointed out that the right and control of the custody of his wife's dead body did not go the extent of preventing such disposal of it as might be necessary to keep it from injurying another human being. The viable human fetus had the same right to live as had any other human being.

REPETITION OF CAESARIAN SECTIONS

The danger of repeated Caesarians on the same patient does not differ materially from the danger of the original operation, provided the operation is performed promptly at the beginning of labor.

There is great danger, however, in allowing a patient who has had a Caesarian section, for whatever cause, to remain long in labor, and under no circumstances should the attendant treat the case expectantly, in the hope that a spontaneous delivery will take place. It is true that many cases of delivery by the natural passages, following Caesarian section, have been reported. The attendant can never know, however, the condition of the cicatrix, and the large number of cases of rupture of the scar at the side of a previous Caesarian section, together with several cases coming under my personal observation, lead me to believe that the history of one Caesarian section is always an absolute indication for Caesarian section in future pregnancies.

The technique does not vary greatly from that of the original operation. In some cases the presence of adhesions will prove troublesome. As many as six Caesarians on the same woman have been reported.

CHAPTER 22

Embryotomy

Def. **Embryotomy** comprises all operations upon the fetus which have for their object a sufficient reduction in size to make extraction by the natural passages possible.

By **craniotomy** we mean an operation for the reduction in size of the fetal head.

By **decapitation** we mean the separation of the head from the body.

By **evisceration** we mean the opening of the thoracic and abdominal cavities, and the removal of the whole or a part of their contents. **Cleidotomy** signifies the

division of one or both of the clavicles, in order to reduce the bisacromial diameter.

Indications

1. **Child dead.** Any indication calling for the rapid termination of labor. It should be our rule to abandon all life-saving operations as such as soon as a positive diagnosis of fetal death is made. It is unreasonable to require the delivery of an unmutilated dead fetus at the risk of a difficult operation when the mother's life or health is already jeopardized by the labor. The mother's interests are now at stake and should be alone considered.

2. **Child alive.** A. In obstructed labor due to monstrosities. Hydocephalus is an absolute indication for embryotomy. B. In certain rare instances when the condition of the mother, as shown by temperature, pulse, thinning out of the lower uterine segment, and other objective findings, would render embryotomy safer than any other method of delivery. These conditions are usually met in cases of protracted labor, with frequent vaginal examinations and often several unsuccesful attempts at delivery. The aseptic technique of the attendant has usually been very poor, and there is a certainty that the genital tract is infected. The mortality of Caesarian section in such cases is very high. The Roman Catholic Church has always held that it is wrong to kill a child, regardless of the condition of the child, or its mother. It is also held that if the child is dying, the attendant must await its death though the mother's interests are jeopardized by so waiting. **Legally,** the mother has a right to demand that she be exposed to no unusual danger for the sake of her child, and she may refuse to do so even at the request of her husband. She also has the right, even if opposed by her husband, to run added risk for its sake.* A consent to operation should always be obtained, and if possible, a consultant should be called, in order to protect the interests of the attendant.

Conditions

1. The cervix must be completely dilated. This condition is usually present, since the operation is performed late in labor, after other measures have failed.

2. The membranes must be ruptured. This condition is practically always present.

3. The head should be fixed. If it is engaged, and low in the pelvis, the operation is easier. If the head is

movable above the inlet, it should be steadied by the hands of an assistant, who holds it in position by pressure through the abdominal wall.

4. The pelvis must be large enough to permit the passage of the mutilated fetus. In an absolutely contracted pelvis craniotomy is impossible. (C. V. 5½—6 Cm.)

Embryotomy set—The embryotomy set recommended consists of the following instruments: Naegeli's perforator, with snap catch, (K. S. E-1421); Auvard's cranioclast, (K. S. E-863); Braun's decapitation hook (blunt hook); Small caniotomy forceps; Decapitating scissors. In addition to these, the instruments for a perineorrhaphy should be sterilized.

Technique, craniotomy

Preparation. The patient is surgically prepared, upon an operating table, in the dorsal lithotomy position. Complete anaesthesia is necessary. The usual rigid asepsis is essential, since we frequently have an exhausted patient, who is more susceptible to infection than the normal case.

Perforation. We should always perforate in that part of the fetal head to which the cranioclast may be applied in such a manner that traction will preserve the same mechanism which would normally take place. In vertex presentation, flexion is characteristic of the mechanism, and the cranioclast should be applied over the occiput and not over the forehead, since traction at that point would cause a deflexion. In mento-posterior positions, we would perforate through an eye or the glabella, and would pass one blade through this opening and the second blade over the lower jaw. Traction would then bring about a deflexion, which is desirable in this position. **Do not perforate through sutures and fontanelles,** since overlapping is likely to occur as soon as the perforator is removed, thus rendering the opening difficult to find and interfering with the operation.

If the head is movable, it is steadied by an assistant, externally, or the scalp is grasped with a strong vulsellum forceps and fixed in the pelvis. One hand is passed up to the presenting part, and the perforator is carefully guided to its position at the selected site for perforation. During the introduction, the vaginal walls are carefully guarded from injury, by the fingers of the internal hand. The perforator is now passed into the skull with a twisting, boring motion, taking

care not to push up forcibly on the head. As this operation is frequently performed in the presence of a threatened rupture of the uterus, this point is of great importance. After the perforator has entered the cranial vault, the blades are separated and the instrument completely rotated, thus insuring ample room for the introduction of the cranioclast. The perforator then is removed.

Excerebration. It was formerly considered necessary to wash out the brain substance, but this is rarely necessary. If it is done, a metal intrauterine douche point, connected with an irrigator, is introduced into the skull, and the brain tissue thoroughly broken up and washed out. Sterile water should be used in the irrigator. In any event, the brain tissue should be broken up with the finger or a dressing forceps, especial care being taken to destroy the medulla, since otherwise the child might gasp after delivery.

Cranioclasis. If the Auvard instrument is used, the solid or middle blade is passed through the perforation, to the base of the skull. I aim to push the tip of the instrument into the foramen magnum. One of the outer blades of the cranioclast is now placed over the occiput, and by means of the compression screw the two blades are brought together and locked. The third blade is now applied over the face, screwed down upon the middle blade, and locked. In the application of the blades, the one essential point is to so apply the instrument that during extraction the normal mechanism will be carried out.

Extraction. Before beginning the extraction, the operator should remove all spiculae of bone, with the forceps or scissors, in order to protect the maternal tissues from laceration. When the operator has obtained a firm purchase upon the crushed head, traction should be made in the same manner as in "Extraction with Forceps." After the delivery of the head, the body follows as in spontaneous labor. It is best to complete the extraction with the instrument, and not to attempt the removal of the blades, as in forceps delivery. If the cranioclast pulls out, a new application is to be made. The face is the strongest part of the head, and if it is possible to apply the instrument so that one blade falls over the face, slipping is not liable to occur. If after strong traction, especially in macerated fetuses, the head pulls off, an excellent method of finish-

ing the extraction is to perforate the chest through the neck. The middle blade is passed into the thorax with its convex curve directed toward the vertebrae, and the external blade, whose curve corresponds to that of the middle blade (No. 1 blade), is passed directly over the back, and the blades screwed together. Thus we secure an extremely firm grip, and extraction is usually easy. If the bite pulls off part of the back as traction is made, successive bites can be secured along the trunk until the sacrum is reached, when the remainder of the fetus can be extracted with cranitomy forceps.

Technique, Embryotomy on the Breech

Perforation. This is made through the pelvic outlet with the Naegeli perforator.

Extraction. The middle blade of the cranioclast is passed into the pelvis, with its convex curve directed toward the anterior wall of the sacrum. The corresponding blade (No. 1 blade) is passed over the sacrum externally. After the instrument is screwed down, traction is made and the fetus is extracted. If the instrument pulls out, additional bites are made along the spinal column until the head is reached, when a craniotomy is done.

Craniotomy, aftercoming head. The best site for perforation of the aftercoming head is through the floor and roof of the mouth, then through the hard palate into the cranial cavity. The middle blade is passed into this opening, while the external blade is placed over the face. Occasionally the perforator can best be passed subcutaneously beneath the tissues at the base of the neck, posteriorly, to the occipital bone, and perforation made at that point. The middle blade enters the perforation, while the external blade is placed over the occiput.

Decapitation

Indications—(1) A **Neglected tranverse** presentation. By this is meant a transverse complicated by a threatened rupture of the uterus. The presence of a threatened rupture contraindicates any operation that will increase the intrauterine tension or that will bring any local pressure to bear on the thinned out lower uterine segment. The fetus is nearly always dead, since it is unable to withstand the strong uterine contractions for any length of time. The idea, then, is to regard the fetus as a foreign body, and to extract it in

such a manner that the intrauterine tension will not be increased. This is best done by decapitation.

(2) **Locked twins.** In the vast majority of locked twins, delivery can be accomplished without the necessity of decapitation, by pushing one of the heads out of the way. Occasionally, when the first twin is a breech and the second a head presentation, arrest of labor occurs which can only be treated by decapitation. As the breech is either dead or dying, its neck is divided with scissors. The decapitated head is then pushed up above the other fetus. Forceps are then used on the second child, and the decapitated head is extracted manually or with the cranioclast.

If two forecoming heads lock, a craniotomy is to be done on the lower head and the body extracted. If the second child is alive, a forceps is then performed. If it is dead, craniotomy is indicated.

(3) **Monsters.** It is usually best to deliver monsters intact.

Technique—If the arm has prolapsed, a sling is tied to it and traction is made by an assistant, in order to make the neck more accessible. Passing the whole hand into the vagina, the neck is encircled by two fingers and a thumb. Guided by these fingers the blunt hook is passed over the neck, and is sunk into the soft tissues of the neck. The hook being well placed, the handle is twisted, slowly pulling at the same time, **turning the knob in the direction of the head.** The thumb must always guard the hook when it comes anterior to the neck. The first half turn breaks the cervical spine, after which the hook takes a deeper hold on the muscles, and a full turn severs these. The skin now remains, and this is packed into the hook with the fingers, and severed with a few complete turns. Extraction of the trunk is made by traction on the arm, or if necessary, by the application of craniotomy forceps or hook to the trunk. **If it is impossible to reach the neck,** it will be necessary to perforate the chest, and remove the heart and lungs. When the chest is emptied, it is more easily drawn down into the inlet, and the neck made accessible to the hook.

The **decapitated head** is delivered by expression from above, traction with the fingers in the mouth, from below, or occasionally by craniotomy. If the latter operation is necessary, the head should be firmly fixed with

strong vulsellum forceps, and the craniotomy carried out as described.

Be careful to avoid injury to the maternal tissues by sharp spicules of bone.

Cleidotomy

Section of the clavicles is used when the fetus is dead, and there is difficulty in the delivery of the shoulders. It should not be done on the living child. It has been found that cleidotomy will reduce the bisacromial diameter by from 2 to 4 cm. The section is made with the craniotomy scissors. Great care should be taken to avoid injuring the maternal tissues.

Evisceration

The removal of the viscera from the thoracic or abdominal cavity is occasionally indicated in a transverse presentation when the neck is inaccessible and decapitation cannot therefore be performed. It may also become necessary in a transverse arrest of an internal podalic version, i. e., when the operator has succeeded in grasping a foot but is unable to complete the version and extraction. Perforation is made in the fetal trunk at the most accessible point, and viscera extracted manually. Usually the body collapses and extraction can easily be done, but if this is not possible the spinal column should be cut through with the scissors and extraction of the divided portions of the trunk proceeded with.

SECTION VII

Reparatory Operations

CHAPTER 23

Repair of Lacerations

IMMEDIATE AND INTERMEDIATE TRACHELORRHAPHY

Indications—On account of the great vascularity of the tissues, and the relatively poor anatomiacl results that follow the repair of cervical lacerations immediately after delivery, as well as the greatly increased danger of infection, this operation is not indicated except for hemorrhage due to the laceration of the cervical branches of the uterine artery, when that hemorrhage cannot be controlled by other means. Occasionally, in a hospital, repair of lacerations of the cervix due to operative delivery may be effected, but the results as a rule are not satisfactory.

By **intermediate repair** we mean an operation performed in from five to ten days after delivery. This is an extremely valuable procedure if the patient is in a hospital, but in the home such a procedure is impracticable.

Technique—The patient is surgically prepared, on a table, under anaesthesia. The anterior and posterior lips of the cervix are grasped with ring sponge holders (not vulsellum forceps, on account of the friability of the tissues, and danger of laceration) and brought into the field. Interrupted, single, No. 2, chromic catgut is used on a cutting needle. The suture is introduced ¼ inch from the cut edge, carried down to the endometrium, and out through the opposite side. The sutures should be about ⅓ inch apart. A continuous suture is used if haste is demanded. No denudation is required. In the presence of cervical hemorrhage, do not try to pick the bleeders, but approximate the cut edges, and control the bleeding in this way.

PERINEAL LACERATIONS

Frequency—Lacerations occur in nearly all primiparae, and a large percentage of multiparae. The obstetrician who claims he can deliver "without a tear" is either deliberately untruthful, or lacks the ability to recognize a laceration when one is present.

Degrees—First degree lacerations are those that involve only the fourchette and the anterior margin of the perineum. These lacerations are never over 1½ cm. in depth.

Second degree lacerations include all tears involving the levator ani muscle, but not extending into the rectum. While these lacerations may occur in the median line, their usual course is upward and outward from the median raphe. The transversus perinei, constrictor cunni and the levator ani are the muscles invelved.

Third degree lacerations are those through the entire perineal body, into the rectum. The sphincter ani is always involved.

Submucous lacerations are lacerations of the pelvic fascia and levator ani, occurring without any tear of skin or mucosa. They are the most frequent variety and are of the greatest clinical importance.

Etiology—(1) **Physical condition of the fetal body.** Large head, due to hydrocephalus or post-maturity; large shoulders; monsters.

(2) **Condition of the maternal tissues.** The tissues of the pelvic floor are likely to be rigid in elderly primiparae, i. e., after the age of 32 years; friable tissues.

(3) **Mechanism of labor, and its effects.** Precipitate labors; abnormal mechanisms, as posterior rotation of the occiput, mento posterior, deflexion of the head; edema of the soft parts due to prolonged labor; former lacerations; scar tissue in the perineum; dry labor; distended bladder or rectum; the necessarily rapid extraction of the head in breech labors; operative procedures.

Prophylaxis—The delivery of the head over the perineum must be slow and intermittent. If the uterine contractions are strong, the head must be held back to allow sufficient relaxation of the soft parts. The alternate progression and retrogression of the head is a valuable factor in labor. This results in an effusion of serum in the perineal tissues and assists remarkably in dilatation. The head must be kept well flexed until the suboccipitobregmatic diameter has passed the outlet,

in order that the smallest diameters of the head distend the perineum. The presenting part is delivered gradually, **under anaesthesia,** in the interval between the pains. (Ritgen maneuver.)

Treatment—By immediate perinorrhaphy we mean a repair during the first two hours following delivery, while intermediate perineorrhaphy refers to an operation from three to five days after delivery. All lacerations, whether recent or old, should be repaired, either at once or within a few days.

Immediate	vs.	Intermediate
More edema and distortion of tissues. Hemorrhage interferes with operation.		Tissues have returned to their normal state. Hemorrhage is slight.
Impossible to determine the extent of the injuries, on account of distortion.		Possible to determine exact extent of injuries.
Infection favored by low resistance due to trauma of labor.		Tissues have regained normal tone and resistance.
Repairs frequently incomplete, on account of lack of assistants, etc.		Complete surgical repair as in any other surgical operation.
In bed shorter time.		In bed 3 to 5 days longer.
Requires anaesthetic at delivery only.		Requires a second anaesthetic.
Results poor.		Results good.
Not practical to repair any but recent lacerations.		All lacerations, new or old, are repaired.

Operation—The operation recommended for either immediate or intermediate repair may be described as follows:

(1) **Preparation** should consist of a low, one quart enema, at least 3 hours before operation. No laxative is required before operation, and the administration of one is not advisable. Patient is shaved, anaesthetized, placed in the extreme lithotomy position, and prepared locally with a 2% Tr. Iodine.

(2) An Allis snap is inserted into the muco-cutaneous junction on each side, at the new border of the perineum. (Opposite posterior terminus of labia minora.)

(3) The tissue between the two snaps is drawn taut,

and with the scissors a strip of tissue ⅛ inch wide, extending from one snap to the other, along the muco-cutaneous margin, is removed.

(4) A pair of Mayo dissecting scissors, closed, is passed into the posterior peri-vaginal tissues, from a point on the denuded area half way between the Allis snap and the mid line of the perineum. The point of the scissors is directed outward, backward, and downward, towards the ischio-rectal fossa. The scissors should be introduced to a depth of 1½ inches, opened, and removed with open blades. Repeat on opposite side. Do not separate tissues in the median line.

(5) Introduce fore-finger into space created, palpate edge of levator ani, grasp with Allis snap, and draw out through wound. Repeat on opposite side.

(6) If necessary, dissect back vaginal mucosa in mid line for ½ inch.

(7) Pass a single No. 2 chromic catgut suture, on a non-cutting needle, through the muscle on one side, and out through the muscle of the opposite side. Introduce a second suture ½ inch posterior to the first. Tie both sutures, drawing the muscles into the midline, and carefully preventing the inclusion of vaginal mucosa in the suture.

(8) Introduce No. 2 chromic single, catgut or silkwormgut sutures from skin surface, including fascia, and drawing skin together. Begin at lower angle. Tie, carefully preventing inversion of skin.

Practical application—In a recent laceration steps 2 and 3 are omitted and in 4 the scissors are introduced through torn edge. Obliterate all dead space. When the muscles are drawn down there is considerable bleeding, which will stop as soon as the muscles are drawn together. If the old operation for the repair of recent lacerations are used, the repair may be made while waiting for the expulsion of the placenta. Small tears should be sutured not only for the sake of the integrity of the pelvic floor, but to prevent a focus for infection. Catgut should be used as buried sutures and in the vagina.

After-care of perineorrhaphies—(1) Wash perineum with a non-alcoholic solution of green soap once a day. Use cotton pledgets, washing off the soap with sterile water and drying with cotton or gauze.

(2) Use no external douches or external flushings.

(3) Use no antiseptics or germicides. They lower the resistance of the tissues.
(4) Remove bloody lochia whenever necessary, with pledgets and water.
(5) Keep the patient's knees hobbled until the sutures are out, in order to avoid pain by preventing undue strain upon the sutures.
(6) The bowels should not be emptied for 48 to 72 hours after repair. At this time a one quart low enema should be given. It is best to avoid the free use of cathartics after perineorrhaphy, on account of the severe pain which free action of the bowels produces.
(7) The author does not allow the baby to nurse during the first twenty-four hours following repair.
(8) The free use of heroin for the control of pain is advisable. The author has never seen any bad effects upon mother or baby.

SECTION VIII

Accessory Operations

CHAPTER 24

Manual Extraction of the Placenta

Indications—This is one of the most dangerous operations in obstetrics, on account of the likelihood of infection of the placental site. (1) **Hemorrhage** is the most important indication calling for the operation. If the hemorrhage cannot be controlled by massage, and the attendant is unable to deliver the placenta by the Crede maneuver, absolute indication is present.(2) **Incarceration of placenta.** This is usually due to the ill-advised use of ergot, prior to the delivery of the placenta. An "hour-glass" contraction of the uterus results, with retention of the placenta. If there is no hemorrhage, time may be given for the spasm to pass off. It is usually impracticable, however, to wait more than 6 to 12 hours, and manual extraction is best done if delivery cannot be accomplished in that time. Hemorrhage during this period will of course be an absolute indication for immediate interference. (3) **Adherent placenta.** Here again there is no absolute indication to interfere except in the presence of hemorrhage.

Practical applications—There is no danger in allowing the placenta to remain undelivered for several hours, except in the presence of hemorrhage. The mortality of manual extraction, on the other hand, may be as high as 10%. If the patient is in a hospital, where she can be carefully watched for signs of hemorrhage, it is best to wait several hours before performing the operation, unless sooner indicated by hemorrhage. In less favorable surroundings, it may be advisable to do a manual extraction at the end of two hours, if the attendant is unable to deliver the placenta by other means.

Technique—The most rigid asepsis is essential in this operation. On account of the alarming nature of the principal indication, hemorrhage, there is always a tendency to slight the preparations for operation. The

patient must be carefully scrubbed up, placed upon a table, and unless the emergency is extreme and delay will seriously endanger the patient's life, an anaesthetic should be administered, to the surgical degree. The surgically clean, gloved hand is inserted into the uterus and the placenta is separated, beginning if possible at the edge. The outside hand presses the uterus down upon the internal hand, and renders the operation easier. It may be impossible to extract the placenta in once piece, in which event it is to be removed piecemeal. The uterus must be explored after manual extraction, and the attendant should be absolutely certain that the secundines have been completely removed, and the cavity is clean.

A uterine tamponnade is almost invariably indicated after manual extraction of the placenta, there being great tendency toward relaxation of the uterus in these cases, and subsequent secondary postpartum hemorrhage.

CHAPTER 25

Uterine Tamponade

Indications—Hemorrhage, particularly postpartum.

Preparation of packing gauze—The gauze is cut one-half yard wide, into lengths of thirteen yards. The selvedge and cut edge are folded in, this folding being repeated several times until the width is about 2 or 3 inches. The bundle is then boiled for 30 minutes in ½% Liquor Cresolis Comp. solution. A surgically clean nurse, wearing gloves, gown and respirator, now removes the gauze to a sterile dressing table, where it is thoroughly wrung out and packed into sterile Mason jars, or special test tubes 2 inches in diameter and 12 inches in length. The tops are screwed down and the jars, wrapped in thick paper, securely sealed, are sterilized under pressure for two hours on three successive days.

Technique—The operator introduces his entire hand into the fundus of the uterus. An assistant steadies the fundus. With a long uterine packing forceps the end of the gauze strip is carried up to the palm of the hand in the fundus, and is evenly packed into the uterine cavity, from side to side, and from above downward. The inside hand acts as a grooved director, along

which the forceps, carrying the gauze, is directed. The pack must be tight, and to be sure of this the operator should lay aside the packing forceps and grasp the fundus through a sterile towel. At least 10 yards is required for an efficient uterine pack.

The gauze should be removed in from 12 to 24 hours. From 10 to 15 minutes should be spent in slowly removing the gauze, and the operator should be prepared to repack if necessary.

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